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PRELIMINARY SITE INVESTIGATION
PROPOSED INDUSTRIAL PARK DEVELOPMENT
SHELL CHEMICAL PLANT PROPERTY
LOS ANGELES, CALIFORNIA

SFUND RECORDS CTR
88041007

for
CABOT, CABOT & FORBES
C.C.&F. WESTERN DEVELOPMENT CO., INC.
September 22, 1972

Ken O'Brien



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I INTRODUCTION

A. Purpose

The purpose of this report is to present the findings of a preliminary study of the surface and subsurface conditions of the Shell Chemical Plant property located in the southern part of Los Angeles, California.

B. Location

The Shell Chemical Plant property (approximately 277 acres) is located a short distance to the southwest of the intersection of the San Diego and Harbor Freeways. Refer to Plate No's. 1 and 2. The property is separated into two parts. One portion (approximately 195 acres) is bordered on the north by 190th Street, on the east by Vermont Avenue, on the south by the extension of Del Amo Boulevard, and on the west by an industrial area whose frontage is on Normandie Avenue. The second portion (approximately 82 acres) is bordered on the north by Knox Street, on the east by Hamilton Street, on the south by Del Amo Boulevard, and on the west by Vermont Avenue.

C. Authorization

This preliminary site investigation was authorized by Cabot, Cabot & Forbes, C.C.&F. Western Development Co., Inc., Los Angeles, California. The objective of this investigation is to determine the suitability of the Shell Chemical Plant property for development into an industrial park.

D. Scope

This report presents subsurface information including geology, seismology, soils, results of laboratory tests on typical subsurface materials, location of sumps and contaminated areas, description of existing structure foundations, and description of existing utilities (sewers, storm drains, water mains, gas mains, etc.). This report also presents information on surface conditions such as existing streets, railroads, buildings, drainage, utilities, etc.

The findings of the preliminary site investigation are presented to indicate the nature of the problems that will be encountered in developing the Shell Chemical Plant property into an industrial park. The report recommends which existing facilities and utilities should be retained. A series of industrial park layouts were developed and the most promising preliminary plan at this time is included. Refer to Plate No. 3.*

*In Folio

II ENGINEERING GEOLOGY

A. Geology and Physiography

The Shell Chemical Plant site is located physiographically in the Angeles Section of the Pacific Border Province. This particular area is known as the Torrance Plain and is of marine origin.

It is understood that the site prior to construction of the Chemical Plant in 1941 was used for agricultural purposes.

Geologically, the site is underlain by Pliocene and older rocks. Refer to Plate No. 4. These are overlain by the San Pedro formation and unnamed Upper Pleistocene deposits. Above these, occur the Palos Verdes Sand or equivalent of Upper Pleistocene age. The highly fossiliferous sand encountered in Auger Boring No's. 5, 8 and 15 drilled during the subsurface investigation, and the thin coquina beds encountered in Boring No's. 5 and 15 probably represent the basal portion of the Palos Verdes sand zone. The reddish brown deposits encountered in Auger Boring No's. 8, 12, 15, 17, 19, 21 and 22 represent terrace cover of probable flood plain origin or may be the upper few feet of the Palos Verdes sand modified by weathering. The dark brown to black organic near surface material probably represents remains from the original agricultural usage.

B. Faulting

The southernmost trace (exact location uncertain) of the Avalon-Compton fault is located approximately 3 miles northeast of the area of interest on the north flank of Dominguez Hill and trends in a northwest direction.

A short, inferred fault is mapped 3-1/2 miles southeast of the site, trending northwest towards the area of interest. There is no reported evidence of movement along either of these faults during Recent time ($\pm 18,000$ years). The northwest-southeast trending Palos Verdes fault zone is located approximately 5 miles to the southwest of the site. This fault is considered active.

The thin marker beds (shell and Coquina) encountered in Boring No's. 5, 8 and 15 indicate that there has been no displacement at the site due to faulting. No faults are mapped or were observed in the immediate vicinity of the Shell Chemical Plant property.

C. Seismology

A study of epicenter events¹ for the general area (recorded since 1934) reveals that the largest earthquake event in the general area occurred in 1941 and had a magnitude ≥ 5 (Richter scale) but less than 6 (the damaging Long Beach earthquake of 1933 had a magnitude of 6.3). The epicenter for

¹An epicenter map is not included in this report because the latest data available is being compiled for publication by the California Institute of Technology. The information has not been published and is proprietary until that time.

this earthquake appeared to be located in the Palos Verdes fault zone, approximately 5 miles south of the site. Numerous earthquake events of a magnitude of 4 or less have been recorded along this fault zone and in the near vicinity. The latest available information is for 1970 and is considered preliminary. This shows that approximately 17 events of magnitudes of 4 or less occurred along the Palos Verdes fault zone and in the general area of interest (a circle with a 5-mile radius centering on the site) during 1970. The average number of earthquake events over the past 37 years is approximately five per year. With the exception of 1941, all of these events had a magnitude of 4 or less. Most of the events were probably so low in magnitude that they were not noticed by the general public and could only be detected by instrumentation.

It is not possible to predict earthquakes at this point in time. However, the general area (5-mile-radius circle) is seismically active, primarily to the southwest. It is likely that a structure in this area will be subject to the effects of several shocks per year with a magnitude of 4 or less, the majority of which will probably not even be noticed. Some time during the lifetime of structures on this property, they will probably be subjected to the effects of a shock of the magnitude of 5 or 6. A microregionalization map of the Los Angeles Basin shows that a shock with a probable maximum intensity of VIII (Modified Mercalli scale) is possible within a 100-year period in the general area of the proposed site.

As there is no evidence of faulting in the immediate vicinity of the site, the probability of surface rupture due to earthquake activity is remote.

Ground shaking intensity depends on the distance from the earthquake source (epicenter, fault), i.e. the greater the distance, the less the intensity but the longer the duration; however, soil conditions can influence the intensity.

Soil conditions at this site are generally favorable in that the material encountered consists of a relatively homogeneous and dense lithologic sequence. A general classification of the materials encountered are: sandy clay, clayey sand, sand, and silty/clayey sand. The relative blow count, by a standard penetration test (i.e. driving a 1-1/2-inch I.D. split spoon sampler with a 140-pound hammer falling 30 inches) ranges from 8 to 39 blows per foot of penetration.

Two of the 38 borings drilled at the site were to depths of 50 feet and one was drilled to 60 feet. Two of the three deep borings encountered an extremely well cemented shell formation (Coquina) at 45 and 49 feet (Boring No's. 5 and 15). Refer to Plate No's. 35 and 45.

D. Subsidence

In several areas of the Los Angeles basin, ground subsidence has been occurring due to pressure relief from the withdrawal of fluids from deep oil, gas, and water zones.

Mr. L. R. Donkle, Staff Engineer, Shell Chemical Company, who has been assigned to the plant for 29 years, reports that no subsidence has been noted in the plant area during his tenure.

E. Partial Reference - Engineering Geology

Albee, Arden L. and Smith, J. L.; Earthquake Characteristics and Fault Activity in Southern California, 1966.

Barosh, J. P.; Use of Seismic Intensity Data to Predict the Effects of Earthquakes and Underground Nuclear Explosions in Various Geologic Settings, USGS Bulletin 1279, 1969.

California Department of Water Resources; Crustal Strain and Fault Movement Investigation, Bulletin 116-2, 1964.

California Division of Mines and Geology; Earthquake Intensities, 1972.

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California Division of Mines and Geology; Provisional Fault Map of California, 1972.

Hileman, J.; Southern California Network Epicenter Maps (unpublished), California Institute of Technology, 1972.

Poland, J. F., Garrett, A. A. and Simnott, A.; Geology, Hydrology, and Chemical Character of Ground Waters in the Torrance-Santa Monica Area, California, USGS Water Supply Paper 1461, 1959.

Wiegel, Robert L., et al.; Earthquake Engineering, 1970.

III SOIL INVESTIGATION

A. Field Investigation

The subsurface field investigation consisted of drilling auger borings and excavating backhoe trenches within the Shell Chemical Plant property at the locations shown on Plate No. 5.* Western Laboratories arranged for the bucket auger drilling and backhoe trench excavations. Twenty-two auger borings were drilled with an 18-inch bucket auger. Nineteen borings were drilled to a depth of 25 feet, two to a depth of 50 feet, and one to a depth of 60 feet. Contaminated Area No's. 1 and 2 discovered by Boring No. 2 were investigated for areal extent and depth by drilling sixteen 24-inch bucket auger borings and excavating 34 backhoe trenches. The oil and chemical Contaminated Area No. 3 discovered by visual reconnaissance was investigated for areal extent and depth by excavation of three backhoe trenches (No's. 23, 26 and 27). Two other backhoe trenches (No's. 24 and 25) were excavated to examine other potential contaminated areas. Refer to Plate No. 5* for the location of the auger borings, backhoe trenches and contaminated areas.

Engineering geologists (one each from Western Laboratories and Ken O'Brien & Associates) supervised the drilling of the auger borings and backhoe trenches, classified the subsurface materials, and prepared a field log for each boring and backhoe trench. The auger boring and backhoe trench logs are included, Plate No's. 31 through 74.

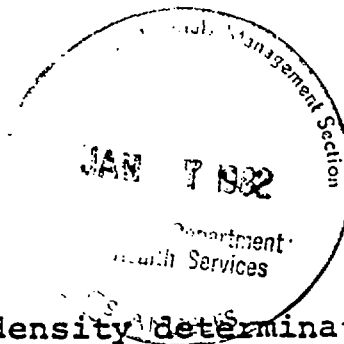
*In Folio

Soil samples were recovered from the auger borings utilizing a 2.43-inch I.D. split spoon sampler that contained either 1-inch rings and/or 5- or 6-inch sleeves. Standard penetration tests were made with a 1-1/2-inch I.D. split spoon sampler driven by a 140-pound hammer falling 30 inches. Disturbed samples were also recovered at various intervals for moisture content determination and grading analysis.

B. Laboratory Testing

Representative samples of subsurface materials recovered from the soil borings were subjected to the following laboratory tests that were performed by Western Laboratories.

In situ Moisture Content
In situ Density
Gradation/Hydrometer
Atterberg Limits
Unconfined Compression
Consolidation and Swell
Swell Tests
Direct Shear



The in situ moisture content and density determinations are recorded on the boring logs. The results of the remainder of the tests are presented on Plate No's. 9 through 30.

C. Subsurface Conditions

The materials encountered in the soil borings consisted of a heterogeneous mixture of sandy clay, clayey sand, silty sand, sand, sandy silt and silty clay. This heterogeneous mixture extends to approximately ± 40 feet in depth. In Boring No's. 5, 8 and 15, a thin sand section containing numerous shell fragments

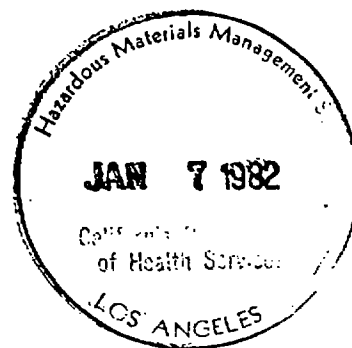
was encountered at 42, 39 and 44 feet, respectively. A well cemented shell bed (Coquina) was encountered at 45 and 49 feet in Boring No's. 5 and 15, respectively. The typical subsurface soil conditions for the Shell Chemical Plant property, except for the contaminated areas, are presented on Plate No. 6.

As previously mentioned, three contaminated areas were found during the subsurface investigation. The areal extent of the contaminated areas is shown on Plate No. 7. A profile of the vertical extent of contamination in Area No's. 1 and 2 are shown on Plate No. 8. The contamination consists of oil-saturated native materials in Area No's. 1 and 2. In Area No. 3, the oil saturation extends to 5-foot depth and below this depth the native materials have been chemically contaminated to approximately 10 feet. The contamination in Area No. 2 also includes debris (broken concrete, wood, old tires, etc.) that was dumped into the sumps.

D. Properties of the Subsurface Materials

The properties of the subsurface materials encountered at the Shell Chemical Plant property based on laboratory tests are summarized in the following tabulation:

<u>Property</u>	<u>Range</u>	<u>Average</u>
In situ Moisture Content - % dry weight	5 to 37	16
In situ Dry Density - lbs/ft ³	79 to 134	112
Liquid Limit (sandy clay @ 3.5 to 4.5 foot depth)	32 to 43	37
Plasticity Index (sand clay @ 3.5 to 4.5 foot depth)	10 to 23	18
Unconfined Compressive Strength (kips/ft ²)	3.1 to 12.4	7.3
Standard Penetration - blow/ft	8 to 39	20
Expansion - percent	0.23 to 0.95	0.55
Direct Shear Test Results		
Cohesion - lbs/ft ²	800 to 1,450	1,195
Angle of friction (Ø) - degrees	24 to 32	27





IV SITE EVALUATION AND ANALYSIS

A. Site Description

The Shell Chemical Plant property (approximately 277 acres) as previously described is separated into two parts by Vermont Avenue. The portion west of Vermont Avenue (approximately 195 acres) is bordered on the north by 190th Street, on the south by the dedicated right-of-way for Del Amo Boulevard, and on the west by a Los Angeles County industrial area whose frontage is on Normandie Avenue. The portion east of Vermont Avenue (approximately 82 acres) is bordered on the north by Knox Street, on the east by Hamilton Street, and on the south by the dedicated right-of-way for Del Amo Boulevard.

The property is very flat; the total relief is 25 feet sloping to the east (approximately 0.7 percent slope). The elevation of the site is 20 to 45 feet above mean sea level.

The Shell Chemical Plant occupies the property consisting of an Elastomer Technical Center; and Butadiene, Styrene and Polymer Units. The existing structures and facilities consist of office buildings, warehouses, shops, compressor stations, pump stations, tanks, stacks, towers, exchangers, vessels, columns, coolers, substations, etc. The existing plant is supported by an extensive system of underground utilities consisting of water distribution systems (domestic, utility and fire), sewer collection system (sanitary and process), storm drains, steam and gas distribution systems.

B. Foundation Conditions

The soil investigation revealed that the subsurface materials are competent except for three contaminated areas. The subsurface materials consist of a heterogeneous mixture of sandy clay, clayey sand, silty sand, sandy silt and silty clay to a depth of approximately 40 feet. Below that depth, the subsurface materials consist of sand and shell fragments including a well cemented shell bed (Coquina) to approximately 57 feet.

Because of the competent nature of the subsurface materials, spread footing foundations can be utilized to support structures that may be constructed at this proposed industrial park site. Based on strength data determined by laboratory tests, the following are allowable soil bearing values for the near subsurface materials:

Continuous Footings	-	4,000 pounds per square foot
Square Footings	-	5,000 pounds per square foot

The depth of embedment of footings must be equal to or greater than the width of the footing. The above bearing values are for maximum embedment of 5 feet and includes normal live load plus dead load and the weight of the footing.

Settlement analyses were made in order to obtain an order of magnitude of settlement under foundation loads. For a 5-foot square footing embedded 5 feet with a load of 5,000 pounds per square foot, the settlement will range from 2 to

5 inches. The maximum settlement assumes the subsurface soil conditions reflect the weakest material encountered. The 2-inch settlement assumes the subsurface conditions reflect the strongest material encountered. For smaller size footings, the settlement will be considerably less. The 5-inch settlement is a theoretical value that would never actually be attained because allowable load would never be imposed on the foundation soils 100 percent of the time.

Pilings or caissons would only be required to support extremely heavy structures. For the normal light to medium type industrial structures, spread footings can be utilized without problem.

Each foundation design for industrial structures must be individually analyzed. The foregoing bearing values and estimated amount of settlement are given for informational purposes only and should not be used carte blanche.

C. Contaminated Areas

Three contaminated areas were disclosed during the subsurface investigation. As previously mentioned, the areal extent of the contaminated areas is shown on Plate No. 7 and the profile of the vertical extent of Contaminated Area No's. 1 and 2 is given on Plate No. 8.

In Area No's. 1 and 2, the contamination consists of oil-saturated materials that are soft and unstable. In addition, Area No. 2 contains debris consisting of concrete rubble, organic material, steel, clay pipe, etc. The depth of contamination

in Area No. 1 is 5 feet and in Area No. 2, is 25 feet. In Area No. 3, the oil saturation extends to 5-foot depth and below this depth, the native materials have been chemically contaminated to approximately 10 feet.

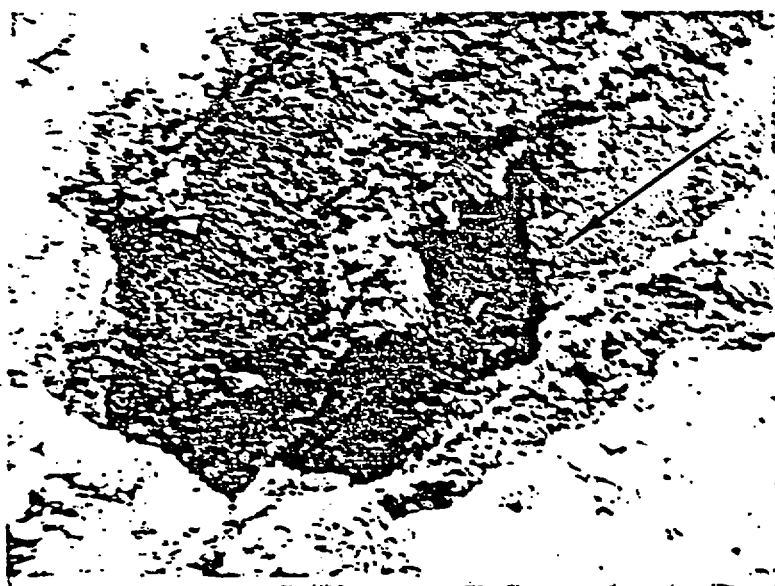
Area No. 1 is approximately 670 feet long and 110 feet wide (1.7 acres); Area No. 2 is approximately 390 feet long and varies in width from 60 to 150 feet (0.6 acre); and Area No. 3 is approximately 250 feet long and averages 170 feet wide (1.0 acre). The contaminated areas are not suitable as building sites and in their present condition could be used only for parking areas or storage sites. It is feasible to remove and replace the materials in Area No. 1; the feasibility of removing and replacing materials in Area No. 2 is marginal; and it is not feasible to remove and replace the materials in Area No. 3.

The amount of contaminated material in Area No. 1 is approximately 15,000 cubic yards. The cost to remove this material is estimated at \$2.50/cubic yard plus the charge to haul the material to a disposal site. Area No. 2 contains approximately 24,000 cubic yards of contaminated material. The cost to excavate this material will probably amount to \$5.00/cubic yard plus the cost of hauling to a disposal site. Area No. 3 contains approximately 16,000 cubic yards of contaminated material. The cost of excavating this material will be approximately \$4.00/cubic yard plus the cost of transporting the material to a disposal site.

Photograph No's. 1 and 2 (following page) shows the oil-contaminated material and the debris found in Contaminated Area No. 2.



PHOTOGRAPH NO. 1
Oil-Contaminated Material



PHOTOGRAPH NO. 2
Concrete Slab (arrow) and
Miscellaneous Debris

D. Demolition

The Shell Chemical Plant property site contains a great number of structures that are aboveground and the site also includes many underground utilities. The aboveground structures and underground utilities were designed to support a petrochemical operation. Almost all of the buildings and utilities cannot be utilized to support a modern industrial park. Those few permanent buildings that could possibly be usable will require a great deal of renovation and it is most probable that the existing location of these facilities would compromise the planning of an efficient industrial park layout. The existing in-plant road and streets are substandard and do not comply with the requirements of the City of Los Angeles. The railroad tracks within the in-plant area are for the most part improperly located to support a modern industrial park.

All aboveground surface structures should be removed. All near surface foundations (depths of 2 to 3 feet or less) should also be removed. Those foundations which are at a depth greater than 3 feet can remain in place and should be identified so that future industrial park planning and industrial building construction can take into account whether or not they will have to be removed.

All existing underground utility lines that cross or are within the right-of-way of future dedicated streets will have to be removed. All other utility lines can remain in place but

should be purged. These utility lines may have to be removed when industrial building construction and development of individual lots occurs.

A majority of the in-plant railroad track will have to be removed and reconstructed to support the industrial park layout. The railroad track and ties are salvagable. The ballast is not salvagable but can be utilized in the construction of structural sections for streets and parking areas.

The cost of removing railroad track is approximately \$2.00/linear foot. The cost of reconstructing railroad track (utilizing used track and ties with new ballast) is approximately \$10.00/linear foot.

E. Grading

The Shell Chemical Plant property is relatively flat. The total relief is 25 feet; the terrain sloping due east from elevation 45 feet at the west property line to elevation 20 feet at Hamilton Street (approximately 0.7 percent slope). Within the plant site, there are areas that have been raised 3 to 4 feet above the existing grade to provide pads for petrochemical structures.

There should be no problem in rough grading the plant site area to the plan of the future industrial park except for existing utilities and foundations that may be encountered. The surface and subsurface materials can be excavated with conventional

earthmoving equipment. It is not anticipated that a great deal of grading will be required to prepare the site for industrial subdivision development.

F. Streets

The existing road and street system of the Shell Chemical Plant cannot be retained and utilized in the proposed industrial park layout. Further, the in-plant road and streets are substandard and do not comply with the City of Los Angeles Bureau of Engineering requirements.

The Preliminary Industrial Park Layout (Plate No. 3) indicates a tentative layout of streets for the proposed industrial park. The Bureau of Engineering has indicated that the total right-of-way width of 64 feet will have to be provided and dedicated. These collector streets will have a paved width of 44 feet with curbs and gutters and a 10-foot parkway on each side within which will be constructed a 5-foot sidewalk.

The Preliminary Industrial Park Layout plan indicates the extension of Knox Street from the west property line to Vermont Avenue and widening of Knox Street from Vermont Avenue to Hamilton Street. The preliminary plan also indicates the extension of Francisco Street from the west property line easterly to Hamilton Street. Whereas Knox Street can be continuous from Normandie Avenue to Hamilton Street, there are problems in continuing Francisco Street. At the present time, Francisco Street is located within Los Angeles County and there is a

(cul-de-sac at the east end. Unfortunately, an industrial building projects approximately 2 feet northerly of the south curb line of Francisco Street at the east end, and in order to connect Francisco Street, a slight curvature at this location would be required. This may or may not be possible.

The Bureau of Engineering has indicated the following requirements with regard to exterior streets.

An additional 25-foot right-of-way will be required for the proposed Del Amo Boulevard that adjoins the south boundary of the Shell Chemical Plant property and that construction of one-half of a major highway will be required. One-half of the major highway includes a 40-foot paved width, curb and gutter, and a 10-foot parkway that is fully paved with concrete. This requirement by the Bureau of Engineering will require that the property fence be moved northerly 25 feet and that the railroad tracks paralleling Del Amo Boulevard will have to be removed and relocated.

Vermont Avenue is a major highway and at the present time, the right-of-way width is 80 feet. The Bureau of Engineering has indicated that a 100-foot width of right-of-way will be required. This means that an additional dedication of 10 feet on each side of Vermont Avenue will be required from Del Amo Boulevard northerly to Knox Street and 10 feet only on the west side of Vermont Street from Knox Street to 190th Street.

The fence line on the east side of Vermont Avenue between Del Amo Boulevard and Knox Street is on the line of the future right-of-way. There is a fence on the west side of Vermont Avenue from Del Amo Boulevard to Knox Street but it is located westerly of the future right-of-way line. At the present time, the portland cement concrete pavement width of Vermont Avenue on the east side of the centerline from Del Amo Boulevard to Knox Street is 15 feet with a 5-foot asphalt concrete shoulder. The pavement width on the west side is 25 feet with a 5-foot shoulder. North of Knox Street to 190th Street, the pavement width of Vermont Avenue on the west side of the centerline is 25 feet with a 13-foot-wide asphalt concrete shoulder. The fence line on the west side of Vermont Avenue from Knox Street to 190th Street is located along the future right-of-way line.

The Bureau of Engineering has indicated that 190th Street will be constructed to a major highway with a 100-foot right-of-way width. Between the north property line of the Shell Chemical Plant and the new south right-of-way line for 190th Street is a strip of land 50 feet wide which is owned by the City of Los Angeles and contains an open drainage ditch. The Bureau of Engineering has indicated that the City of Los Angeles contemplates the widening of 190th Street at an early date and included therein will be a storm drain constructed by the Los Angeles County Flood Control District. The existing drainage ditch will then be covered and the land sold to the

adjoining property owner. This strip which is 50 feet wide, as previously mentioned, is approximately 1,900 feet long and contains 2.2 acres.

G. Storm Drainage

The development of an industrial park on the Shell Chemical Plant property will require the design and construction of a new storm drainage system. The existing storm drainage system cannot be retained to serve the needs of the proposed industrial development and further will not conform to the requirements of the City of Los Angeles and Los Angeles County Flood Control District.

Fortunately, there are four possible storm drainage outlets for the Shell Chemical Plant property. They are:

- (1) The storm drain in 190th Street which drains to the east.
- (2) The storm drain in Knox Street that drains easterly of Hamilton Avenue to the Harbor Freeway outlet.
- (3) A storm drain located in Kenwood Avenue (a north-south street) located one block south of Del Amo Boulevard, approximately in line with the west boundary of the property.
- (4) A Los Angeles County Flood Control channel that is located approximately 900 feet south of Del Amo Boulevard. Access to the Los Angeles County Flood Control channel can be attained via Hamilton Street or Vermont Avenue.

The capacity of the 190th Street drain, the Knox Street drain, and the Kenwood Avenue drain are limited. The Los Angeles County Flood Control District channel has virtually unlimited capacity. The Bureau of Engineering, City of Los Angeles, recommends that in development of the storm drainage system for the proposed industrial development that the subdivision be divided into four drainage zones. These four zones would drain into the aforementioned existing storm drainage systems.

H. Water

Water for the proposed industrial development on the Shell Chemical Plant property will have to be obtained from the Los Angeles Department of Water and Power (DWP). DWP was contacted to ascertain the requirements they would impose for supplying water to the proposed industrial development.

At the present time, there is an existing DWP water main serving the Shell Chemical Plant. The main is located in the proposed right-of-way to be dedicated for Knox Street. A 24-inch main extends from Normandie Avenue to Vermont Avenue; easterly of Vermont Avenue, the main is reduced in size to 20 inches and extends to the Metropolitan Water District line. DWP indicates that this main has served its useful life (31 years) and would be of no value in serving the proposed industrial development. DWP indicates that a complete new system would have to be developed for the industrial subdivision. The water supply is available at 190th Street and Normandie Avenue.

Off-site improvements would probably have to be extended easterly in 190th Street to Vermont Avenue and southerly in Normandie Avenue to Del Amo Boulevard, in Knox Street from Normandie Avenue to the west property line and in Francisco Street from Normandie Avenue to the west property line. On-site improvements would be required along Vermont Avenue from 190th Street to Del Amo Boulevard, along Avenue A, along Avenue B, along Knox Street from the west boundary to Hamilton Street, along Francisco Street from the west property line to Hamilton Street, within the Del Amo Boulevard right-of-way from Normandie Avenue to Hamilton Street, and along the east side of Hamilton Street from Del Amo Boulevard to Knox Street. Refer to Plate No. 3.

Off-site improvements are those which are constructed within a street right-of-way that requires excavation of pavement and replacement thereof. On-site improvements are those which can be constructed prior to paving within the industrial subdivision, and within existing street rights-of-way outside of the pavement area. The water main that would be extended along Vermont Avenue, Del Amo Boulevard, and Hamilton Street would be considered as on-site improvements because they can be constructed within the street rights-of-way without disturbing the pavement.

Preliminary estimates indicate that 12-inch water mains will be required. The cost per foot of off-site improvements is approximately \$31.50/linear foot. The cost for on-site improvements would be approximately \$13.00/linear foot. Fire hydrants will be required within the industrial development and at the present time, the cost of installing 4 by 4 hydrants is \$784.00 each. However, in the near future, the cost of furnishing and installing fire hydrants will be increased 15 percent.

Along the collector streets, fire hydrants can be installed on one side of the street only and spaced 300 to 400 feet apart. Fire hydrants along major highways will have to be placed on both sides of the street at 300- to 400-foot intervals.

DPW indicates that the total cost of the water system (on- and off-site) will have to be borne by the subdivider and this includes cost of the fire hydrants. The water system can be constructed incrementally; however, the terms of payment are cash in advance.

I. Sewers

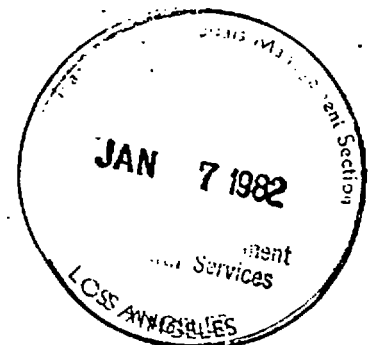
The existing sanitary sewer system for the Shell Chemical Plant cannot be adapted to support the proposed industrial development. Therefore, local sewer mains will have to be constructed in the collector streets and extended to trunk lines. There is an existing trunk sewer line in Vermont Street that extends from just north of Knox Street, southerly to Del Amo Boulevard, and then easterly in the Del Amo Boulevard

right-of-way to Hamilton Street. There is also a trunk sewer in Normandie Avenue that flows southerly.

The Bureau of Engineering, City of Los Angeles, has indicated that they will designate to which trunk line the sewage collection system for the proposed industrial development will drain. There is adequate capacity in Vermont Avenue and Normandie Avenue to accommodate the sanitary sewage that will be generated in the proposed industrial development.

J. Electricity

The demolition of the Shell Chemical Plant will necessarily include removal of the electrical distribution system. Therefore, an entire new system will be required for the proposed industrial development. The electrical power for the industrial development will be supplied by the Los Angeles Department of Water and Power. There is apparently sufficient power capacity available nearby to support the proposed industrial development. The Preliminary Industrial Park Layout (Plate No. 3) indicates an area reserved for a DPW substation located northerly of the Del Amo Boulevard right-of-way adjoining Normandie Avenue. The electrical distribution system would emanate from this location and extend northerly and easterly.



V SUMMARY AND RECOMMENDATIONS

The following summarizes the pertinent features for the industrial subdivision development of the Shell Chemical Plant property.

A. Site Description

The Shell Chemical Plant is located in the City of Los Angeles, Los Angeles County, California, southwest of the intersection of the San Diego and Harbor Freeways.

The accessibility to the site is good and there are nearby off-ramps from San Diego and Harbor Freeways. Major highways abut the property on the north (190th Street) and on the east (Hamilton Street). Vermont Avenue, a north-south major highway, divides the property into two parts.

The area of the property is approximately 277 acres.

The site is relatively flat, sloping to the east at 0.7 percent grade from elevation 45 feet at the west property line to 20 feet above mean sea level at Hamilton Street.

The subsurface materials are competent; no unusual foundation problems should be encountered except in the three areas that had been used as disposal for oil and chemical materials.



B. Existing Facilities

The existing facilities at the Shell Chemical Plant consist of office buildings, warehouses, vessels, tanks, columns, coalers, exchangers, pump stations, compressor stations, etc. These facilities will have to be removed prior to industrial development since they were designed to support a petrochemical operation and cannot be effectively integrated into a modern and industrial park.

Underground utilities at the Shell Chemical Plant consist of water distribution, sewage collection, storm drainage, and gas distribution. These utilities will virtually have no retention value for industrial development since they too cannot be effectively integrated into a modern industrial park.

C. Analysis of the Features of Industrial Subdivision Development

(1) Grading - No serious grading problems. Materials can be excavated with conventional earthmoving equipment.

(2) Storm Drainage - Four outlets are available for storm drainage and a carefully engineered design can be achieved with relative ease.

(3) Streets - City of Los Angeles, Bureau of Engineering specified that collector streets should be constructed for the interior access to the industrial park lots. These collector streets can be connected to major highways to the north

(190th Street), east (Hamilton Street), west (Normandie Avenue) and within the development (Vermont Avenue)

(4) Water - Los Angeles Department of Water and Power indicates that an adequate water supply is available for proposed industrial development at 190th Street and Normandie Avenue.

(5) Sewage - Sewage collection facilities can be developed to flow into existing trunk lines located in Del Amo Boulevard and Vermont Avenue.

(6) Electricity - Electric power available from Los Angeles Department of Water and Power within the project boundaries.

D. Recommendations

The development of the Shell Chemical Plant property into an industrial subdivision appears to have only two serious problems. The first problem is the demolition of the existing facilities. The demolition of the aboveground facilities should be accomplished without too much problem. Removal of the underground utilities and facilities (foundations) could be costly and it is recommended that only those underground utilities and facilities be removed that are necessary for the development of the proposed industrial subdivision.

The street requirements imposed by the City of Los Angeles Bureau of Engineering for the proposed industrial subdivision development are not unusual except for one element.

This element is with regard to the dedication of 25 feet of additional right-of-way along the south property line for Del Amo Boulevard and the construction of one-half of the major highway. To meet this requirement would necessitate relocation of the railroad tracks paralleling Del Amo Boulevard.

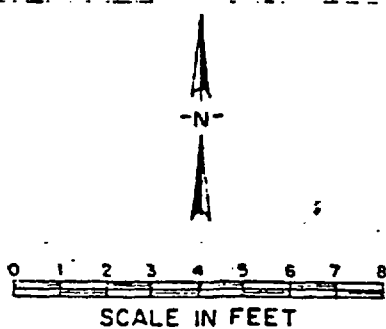
The property south of the Los Angeles Department of Water and Power right-of-way and north of Del Amo Boulevard west of Vermont Avenue is of limited value in its present condition because of the two contaminated areas (total area, 2.3 acres). One of the contaminated areas could be removed; however, the cost of rehabilitating the other contaminated area would be prohibitive. It appears that the area to the south of the Department of Water and Power right-of-way probably has a use for parking or storage only.

The potential commercial or industrial development along Del Amo Boulevard from Normandie Avenue to Hamilton Street is limited to the north of Del Amo Boulevard since the area to the south is residential.

The connection of Del Amo Boulevard to the extension of 203rd Street will require a right angle turn to the north at Normandie Avenue and a left turn 186 feet north onto 203rd Street. Therefore, the creation of an efficient east-west major highway utilizing Del Amo Boulevard and 203rd Street will be difficult.

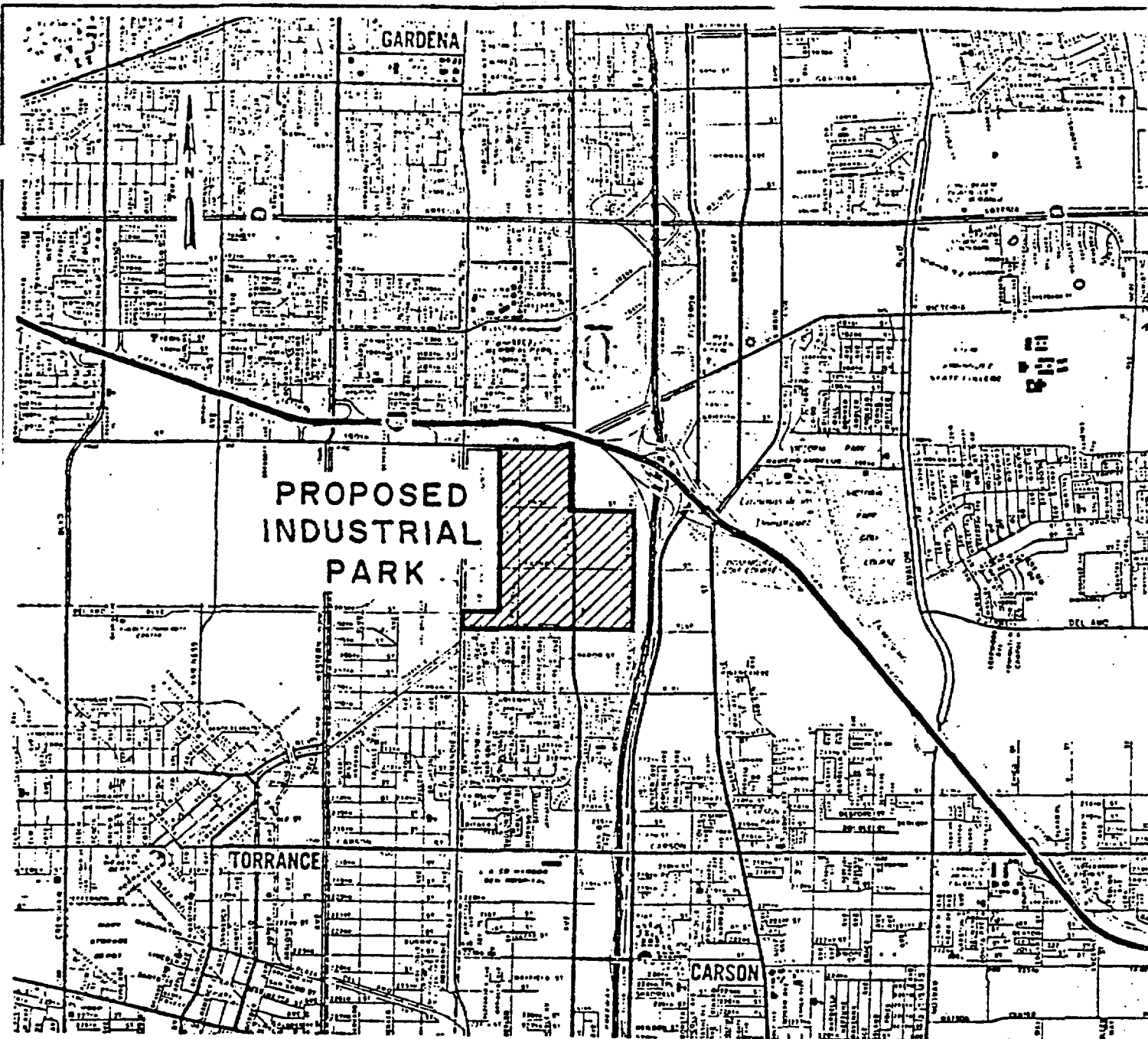
It is recommended that the matter of widening Del Amo Boulevard be pursued as follows. Del Amo Boulevard should be

designated as a collector street and not as a major highway. This would reduce the right-of-way requirement for Del Amo Boulevard from 100 to 64 feet and only 7 feet of additional right-of-way would be required. Dedication of only 7 feet of right-of-way along the south property line would allow the northerly track of the parallel tracks along Del Amo Boulevard to remain in place. The southerly track would have to be removed and the northerly track extended to cross Vermont Avenue, approximately 15 feet north of the existing crossing.



CABOT, CABOT & FORBES
C.C.&F. WESTERN DEVELOPMENT CO., INC
REGIONAL MAP
SHELL CHEMICAL PLANT PROPERTY
Los Angeles, California

DRWN BY: B.J.A.	DATE: 9-21-72	JOB NO.	PLATE NO.
CHKD. BY: H.L.T.	DATE: 9-21-72	7298	1



0 1/4 1/2 3/4 1 1 1/2 2
SCALE IN MILES

525011
Mickel
1/1/72

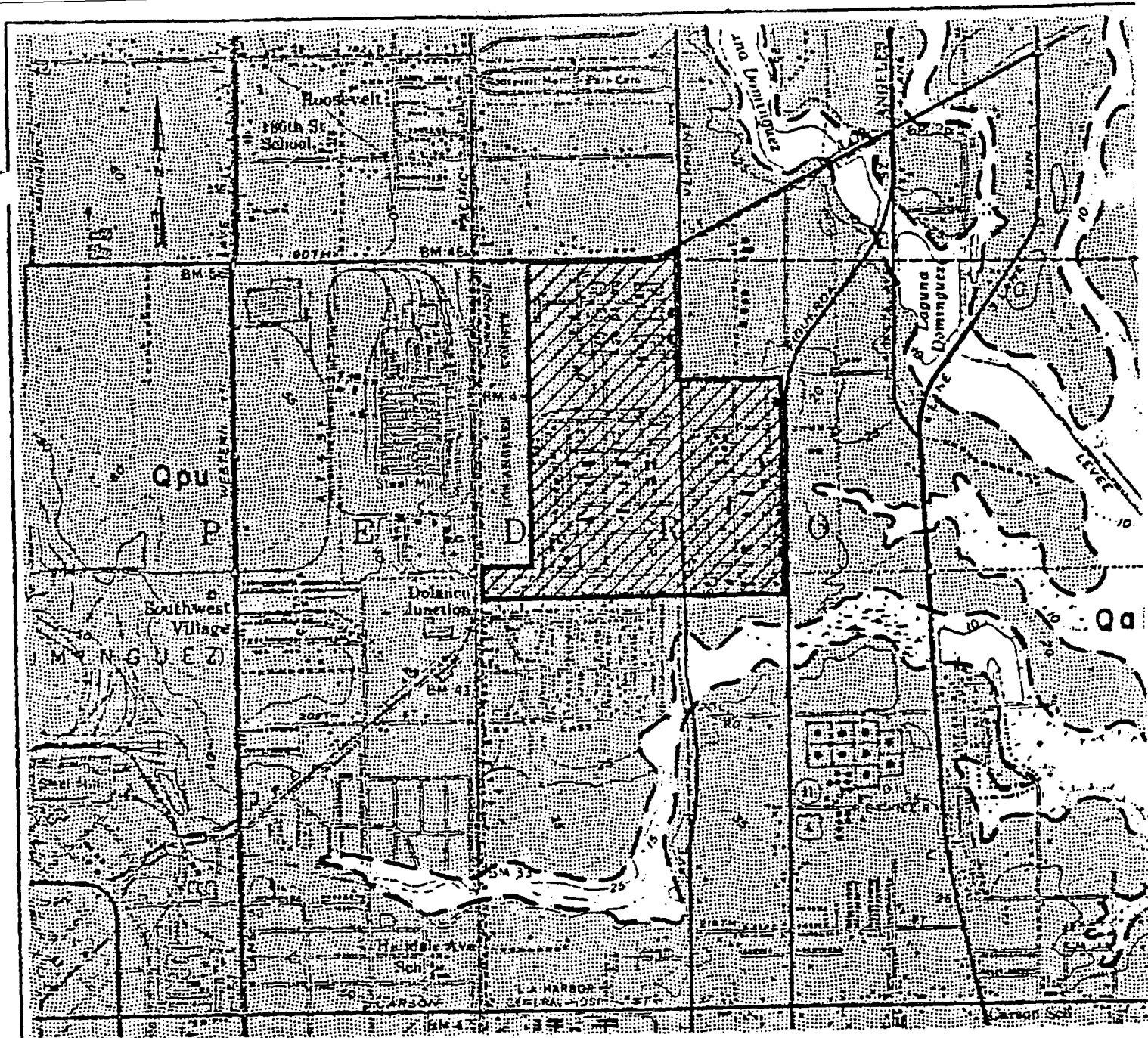
CABOT, CABOT & FORBES
C.C. & F. WESTERN DEVELOPMENT CO., INC

LOCATION MAP

SHELL CHEMICAL PLANT PROPERTY
Los Angeles, California


DRWN BY: V.R.W.	DATE: 9-14-72	JOB NO.	PLATE NO
CHKD. BY: H.L.T.	DATE: 9-20-72	7298.	2

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS



SCALE IN FEET

LEGEND

- Qal** ALLUVIAL & COASTAL DEPOSITS (RECENT)
- Qpu** TERRACE COVER OR PALOS VERDES SAND (UPPER PLEISTOCENE)
- GEOLOGIC CONTACT
-  PROPOSED INDUSTRIAL PARK

REFERENCES:

1. U.S.G.S. WATER SUPPLY PAPER 1461
2. TORRANCE QUADRANGLE MAP
7.5 Minute Series (Topographic)

CABOT, CABOT & FORBES
C.C.&F. WESTERN DEVELOPMENT CO., INC.

GEOLOGIC MAP

SHELL CHEMICAL PLANT PROPERTY
Los Angeles, California

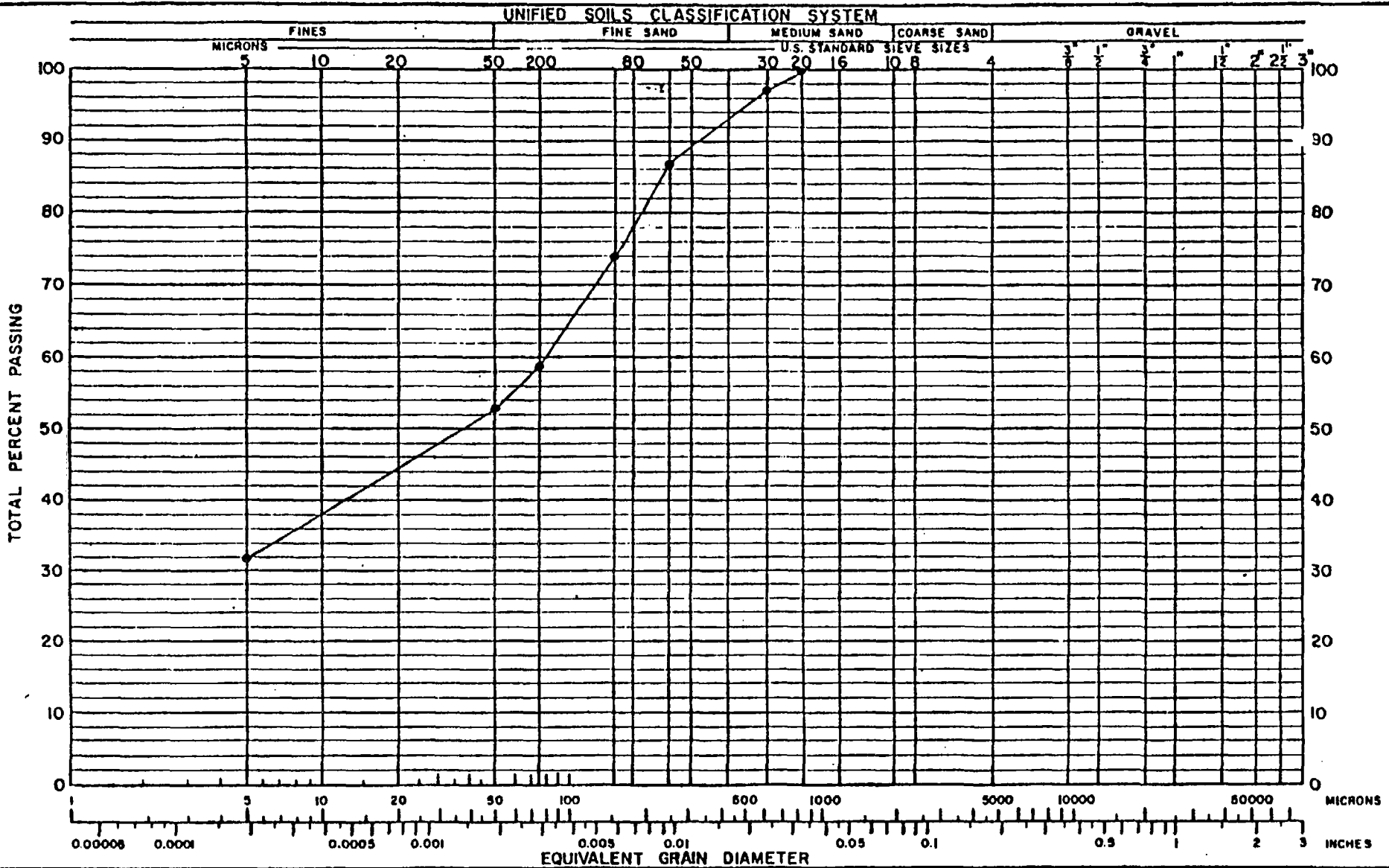
DRWN BY: V.R.W.
CHKD. BY: M.L.T.

DATE: 9-14-72
DATE: 9-20-72

JOB NO.
7298

PLATE N
4

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS



Sample Boring No. 1 Depth: 3.5'

% Sand 47
 % Silt 21
 % Clay 32
 LEAN CLAY (CL-OL)

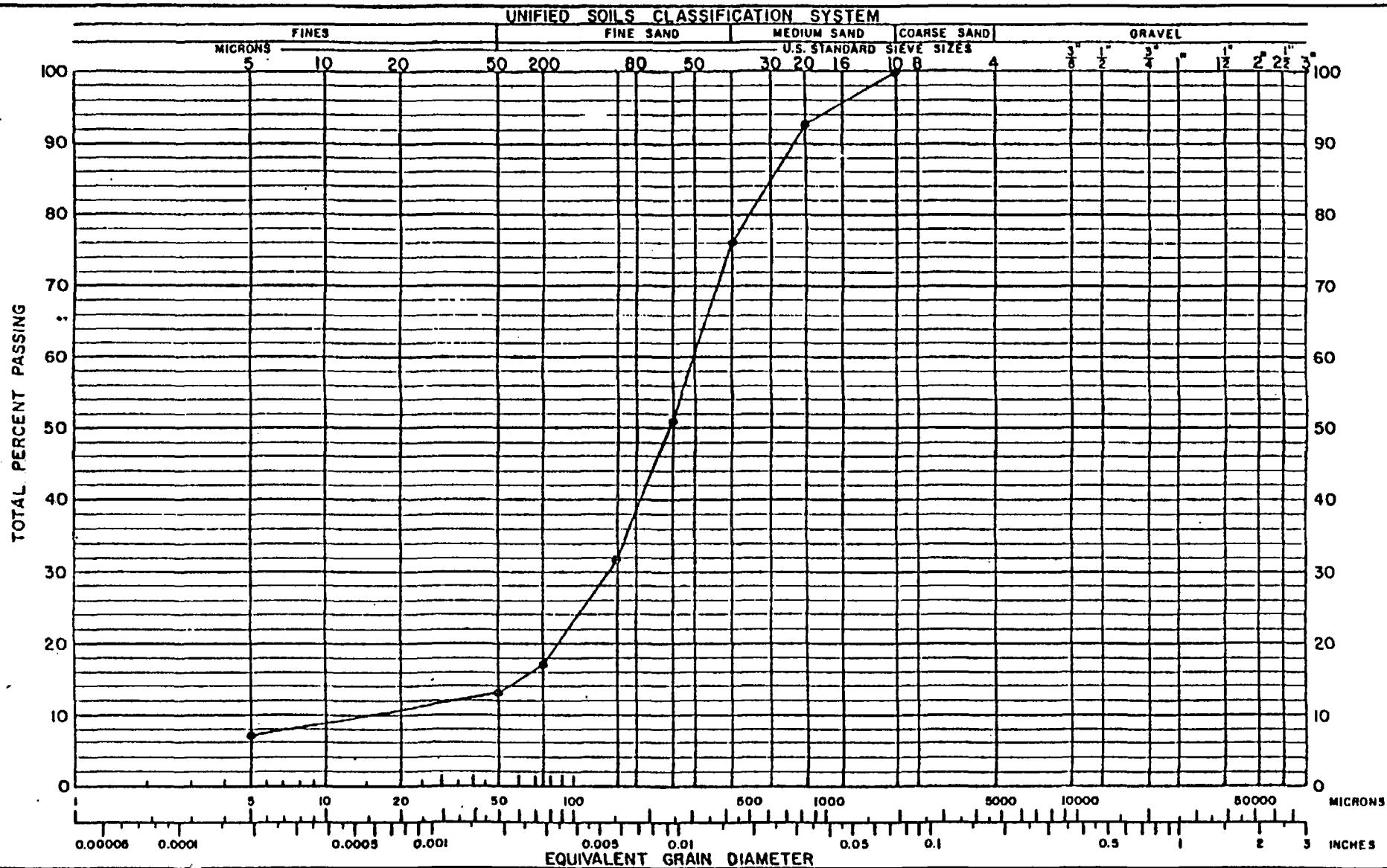
Liquid Limit 37
 Plastic Limit 17
 Plasticity Index 20

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 9

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS



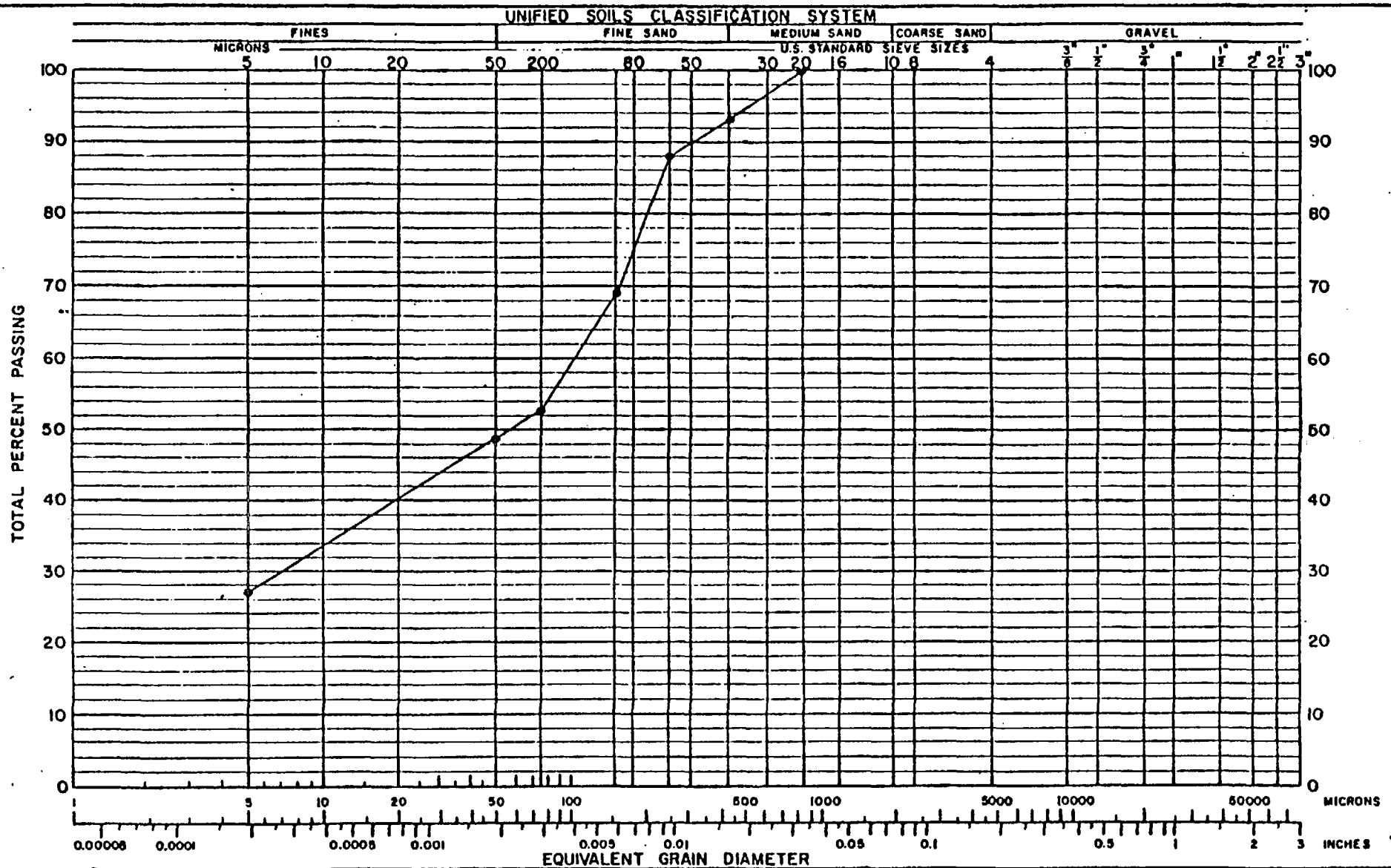
Sample Boring No. 4 Depth: 23.5'

8 Sand 87
 8 Silt 6
 8 Clay 7
 SAND (SW)

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY
GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 10

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS



Sample Boring No. 5 Depth: 3.5'

% Sand 51
 % Silt 22
 % Clay 27
CLAYEY SAND (SC-SM)

Liquid Limit 35
 Plastic Limit 17
 Plasticity Index 18

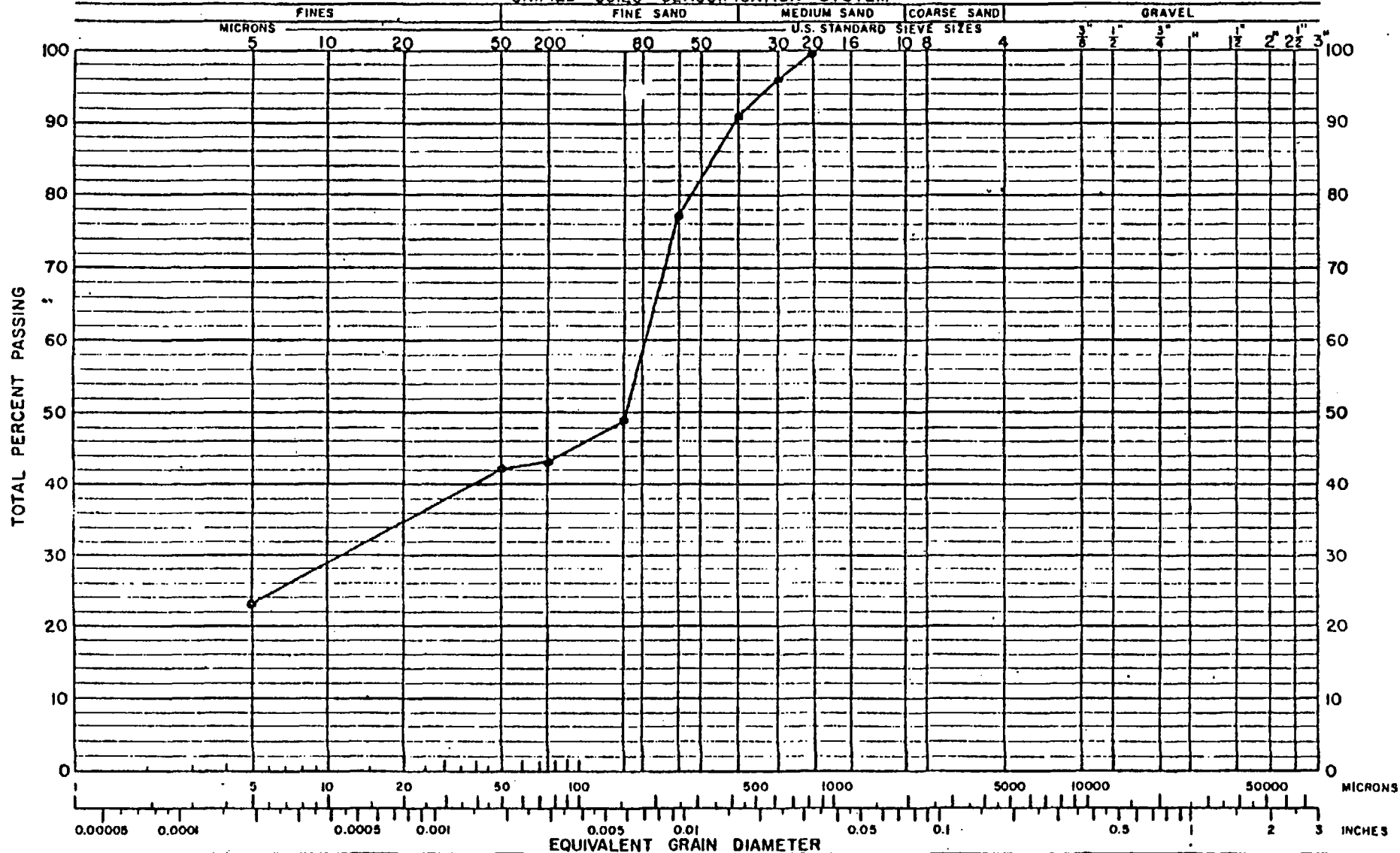
CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 11

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS

UNIFIED SOILS CLASSIFICATION SYSTEM



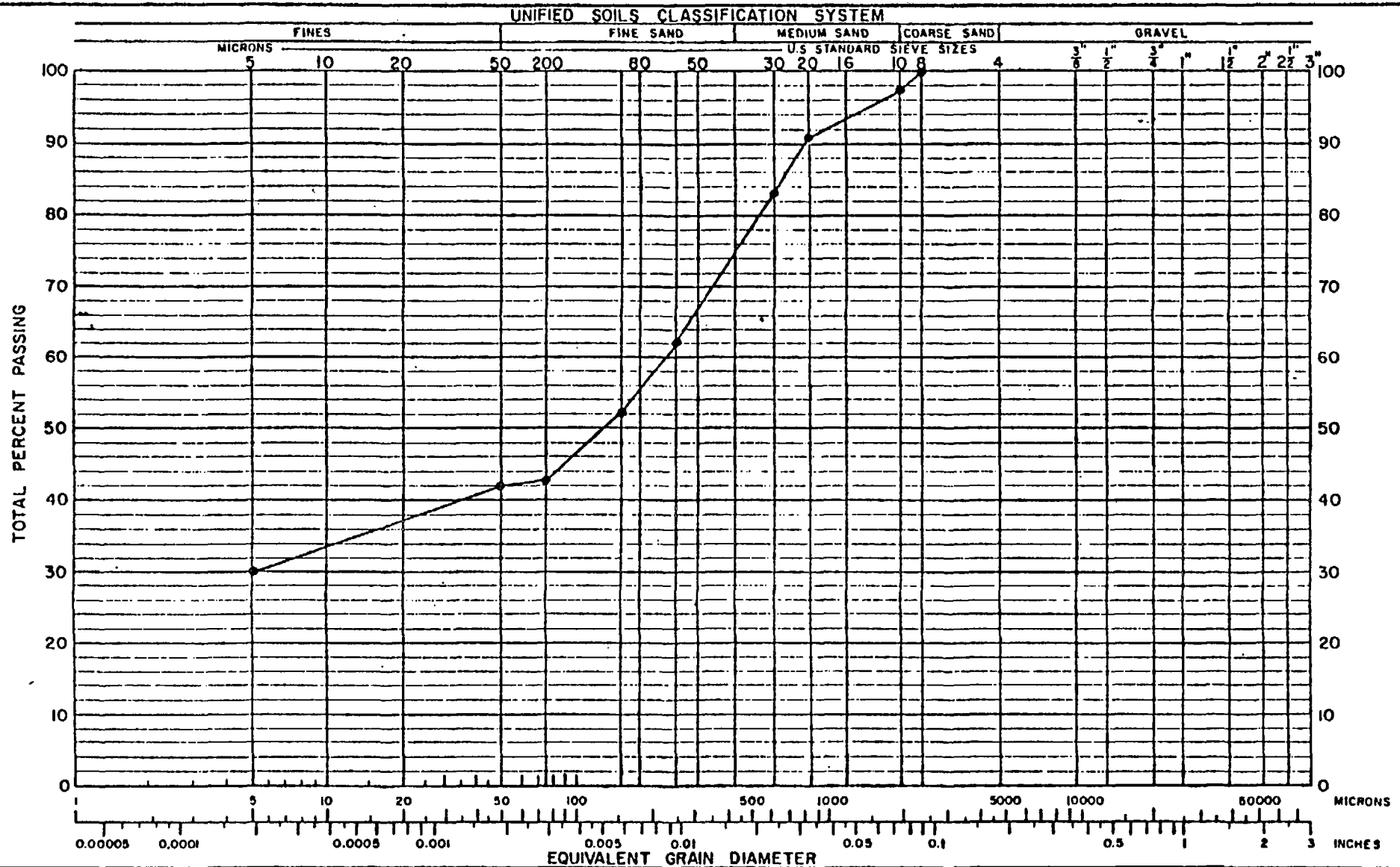
Sample Boring No. 6 Depth: 8.5'

% Sand 58
 % Silt 19
 % Clay 23
 CLAYEY SAND (SC-SM)

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY
 GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 13

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS



Sample Boring No. 6 Depth: 18.5'

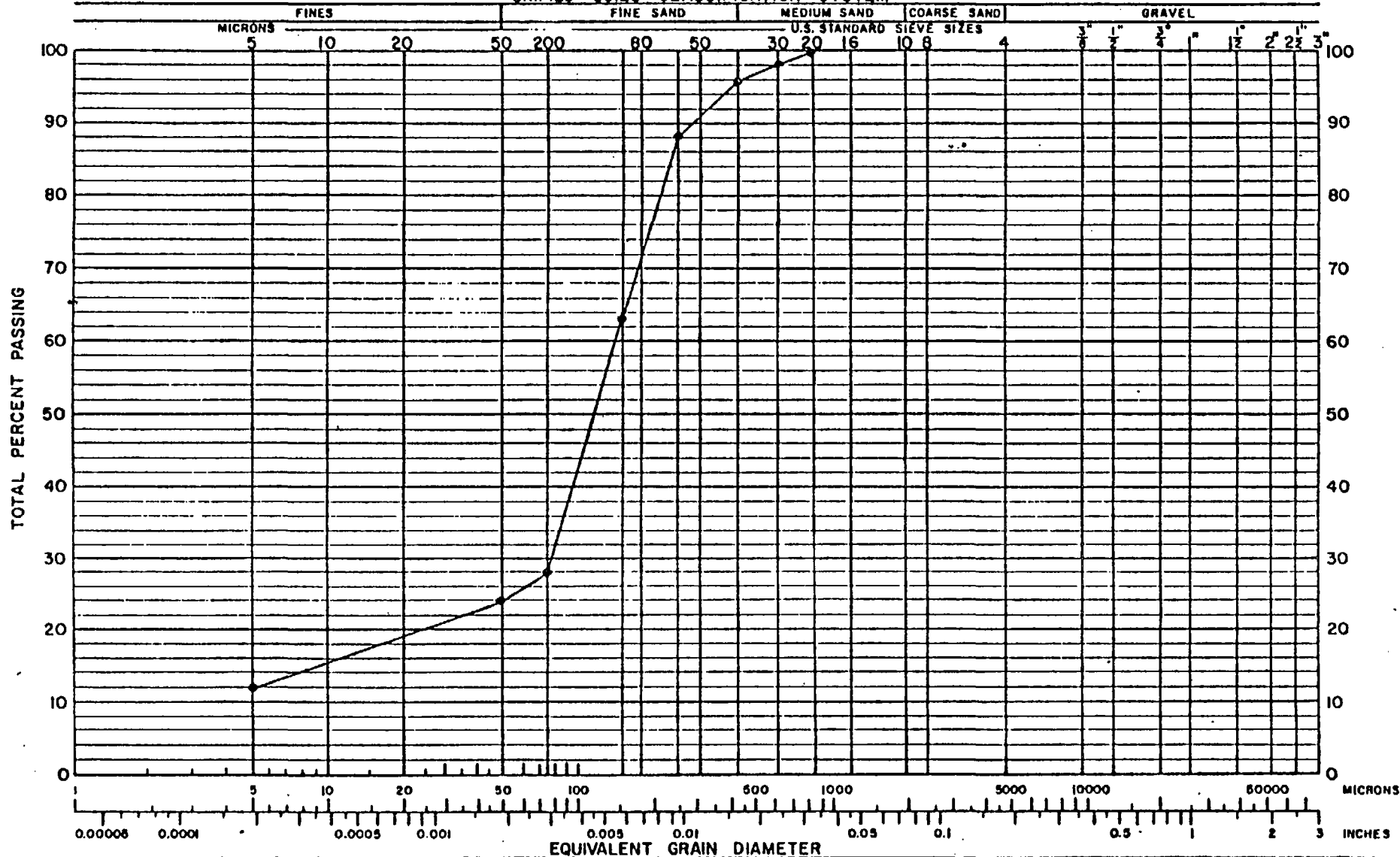
% Sand 58
 % Silt 11
 % Clay 31
 SANDY CLAY (CL)

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY
GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 14

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS

UNIFIED SOILS CLASSIFICATION SYSTEM



Sample Boring No. 6 Depth: 24.0'

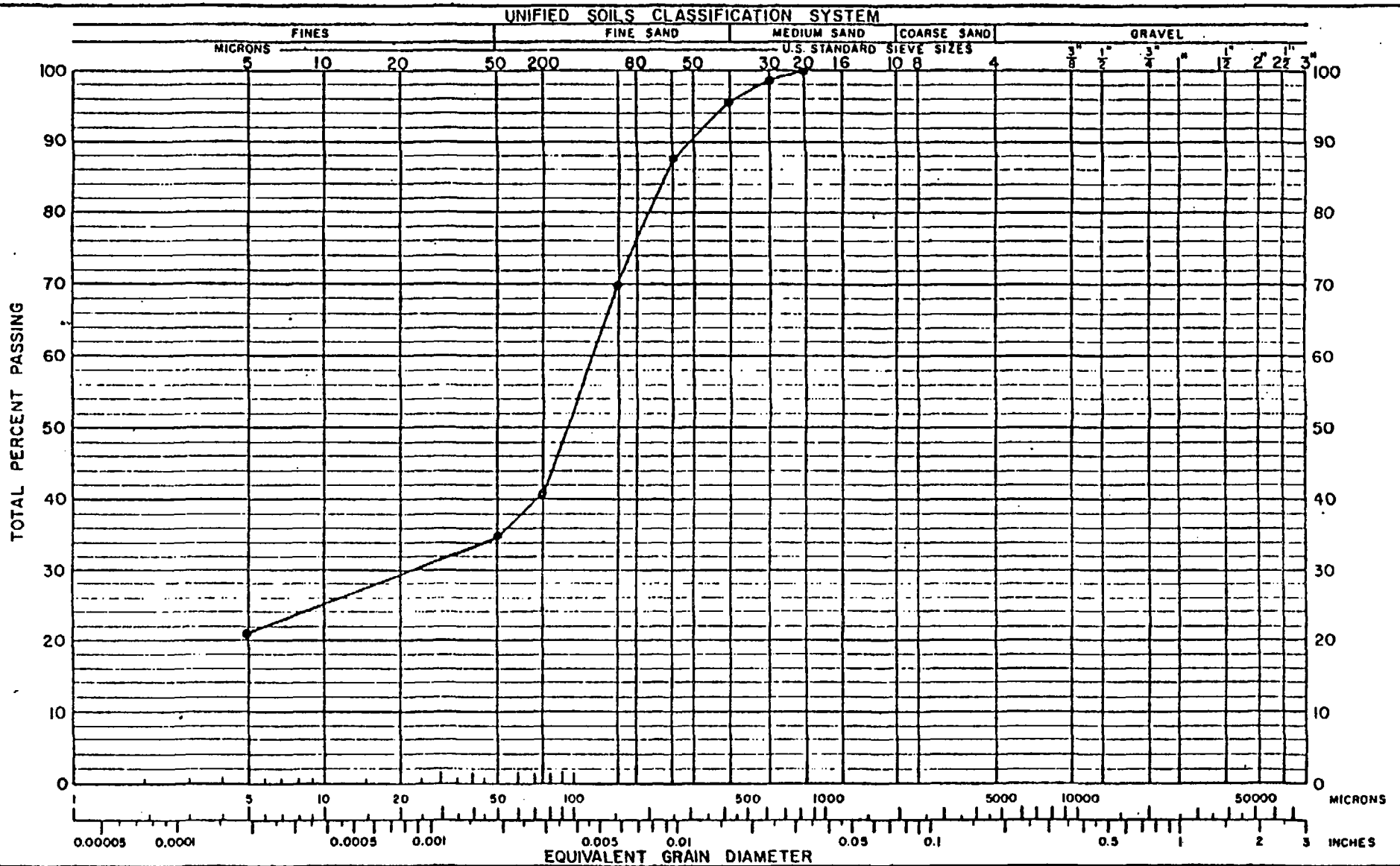
% Sand 76
 % Silt 12
 % Clay 12
 CLAYEY SAND (SC-SM)

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 15

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS



Sample Boring No. 10 Depth: 8.5'

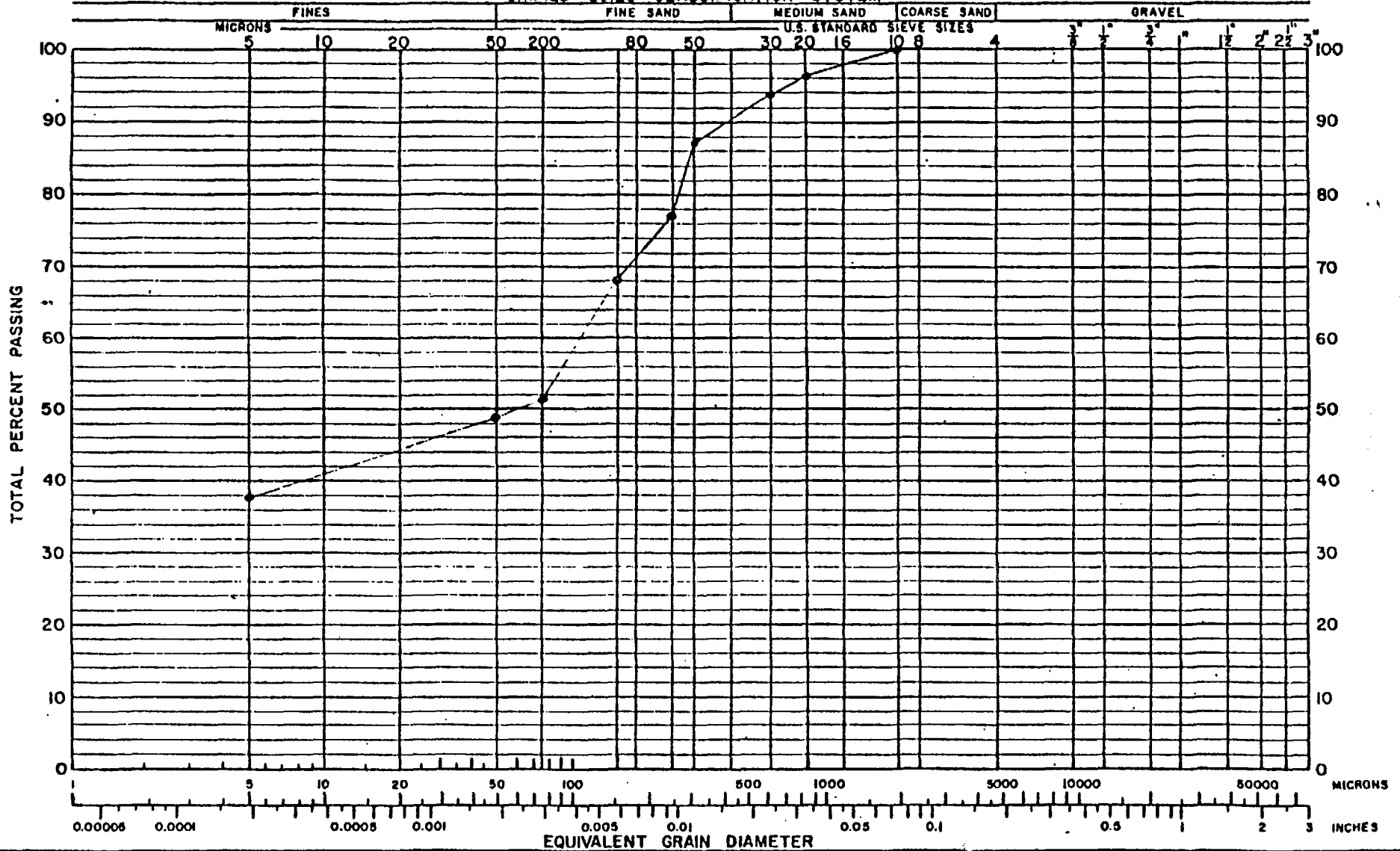
% Sand 65
 % Silt 11
 % Clay 21
 CLAYEY SAND (SC-SM)

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY
GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 11

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS

UNIFIED SOILS CLASSIFICATION SYSTEM



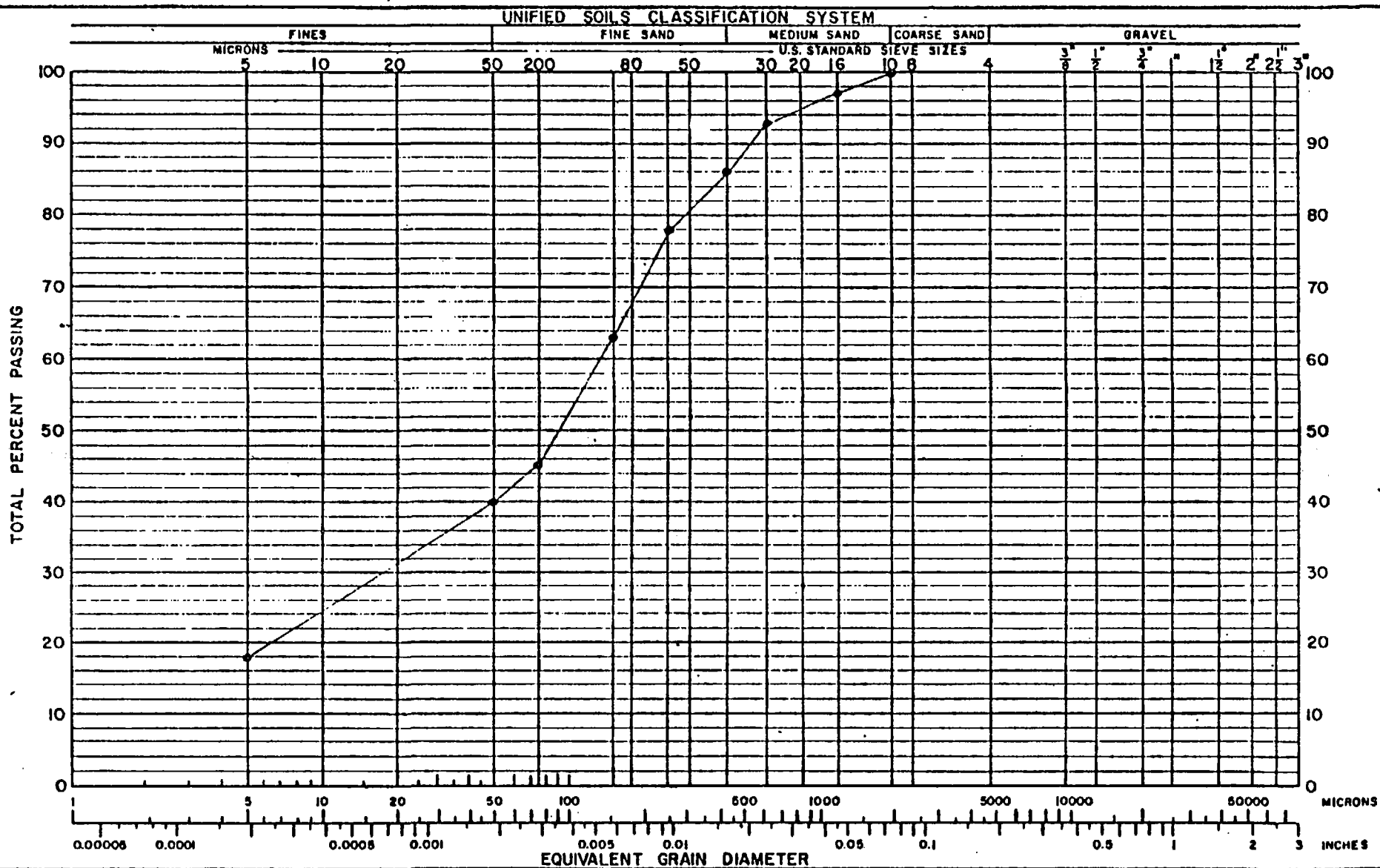
Sample Boring No. 14 Depth: 3.5'

% Sand 51
 % Silt 11
 % Clay 33
 SANDY CLAY (CL)

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY
 GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 18

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS



Sample Boring No. 15 . Depth: 8.5'

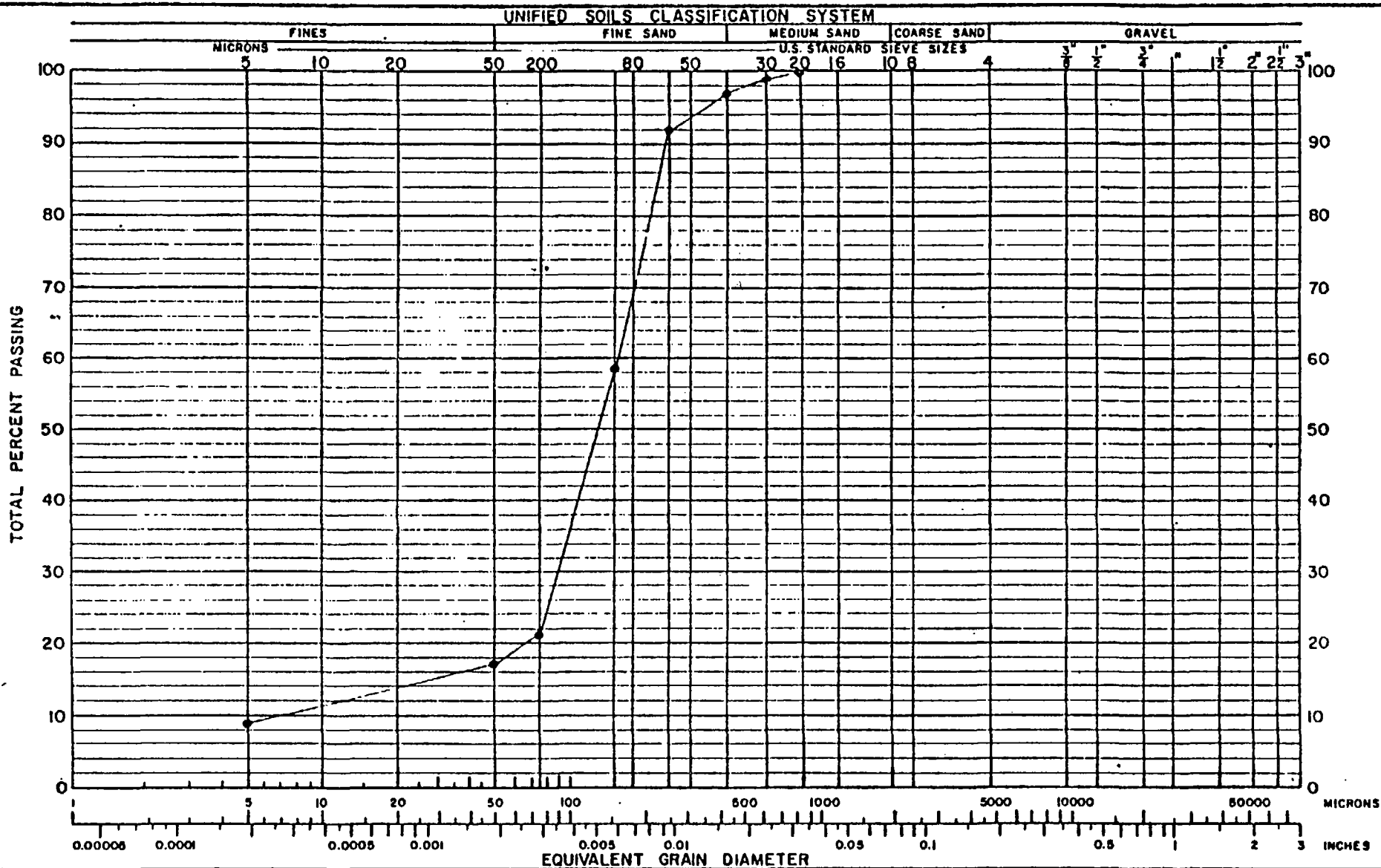
3/4 Sand 60
 3/4 Silt 22
 3/4 Clay 13
 CLAYEY SAND (SC-SM)

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 19

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 CONSULTING ENGINEERS



Sample Boring No. 18 Depth: 13.5'

% Sand 83
 % Silt 8
 % Clay 9
 SAND (SP)

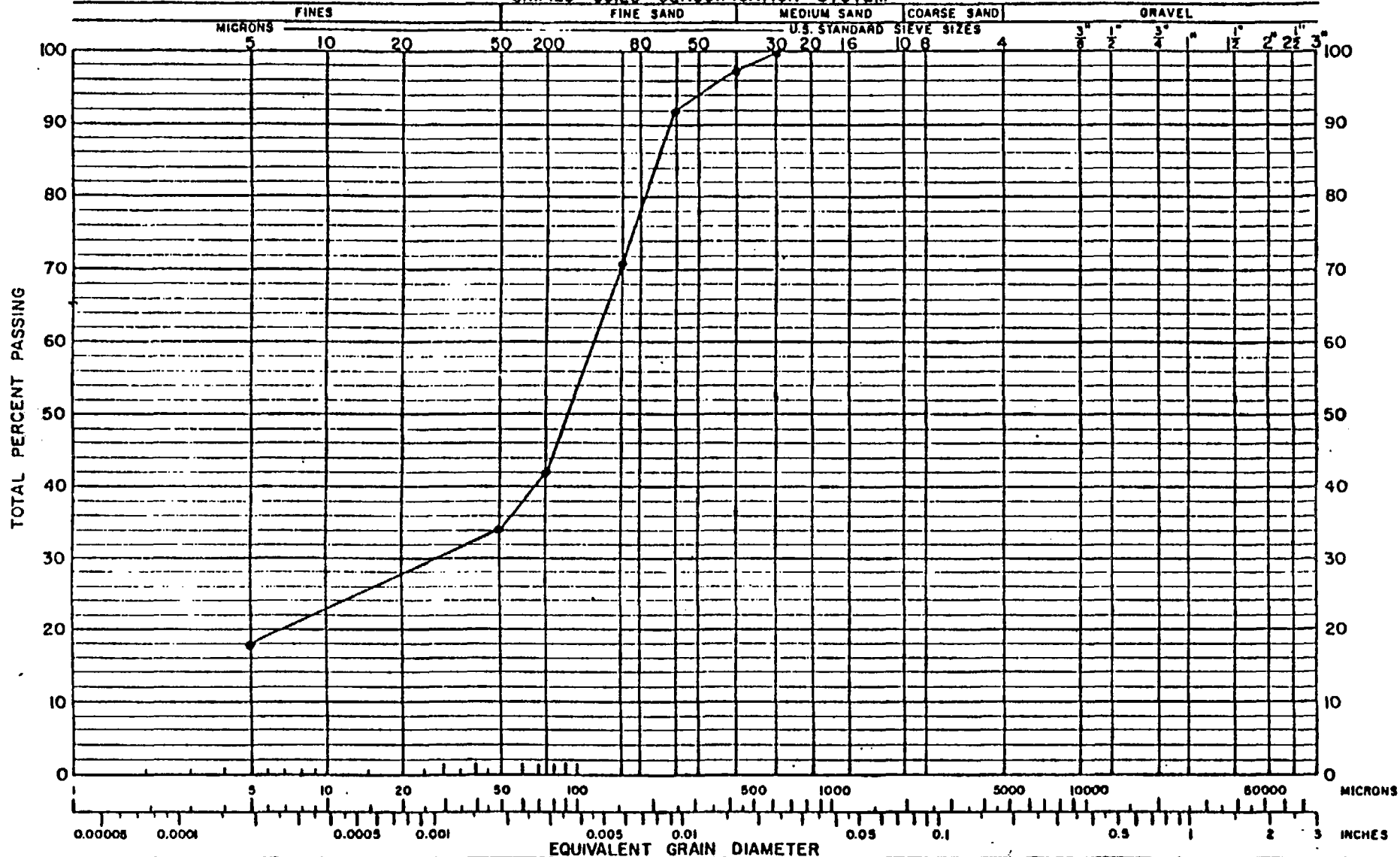
CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 20

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS

UNIFIED SOILS CLASSIFICATION SYSTEM



Sample Boring No. 19 Depth: 8.5'

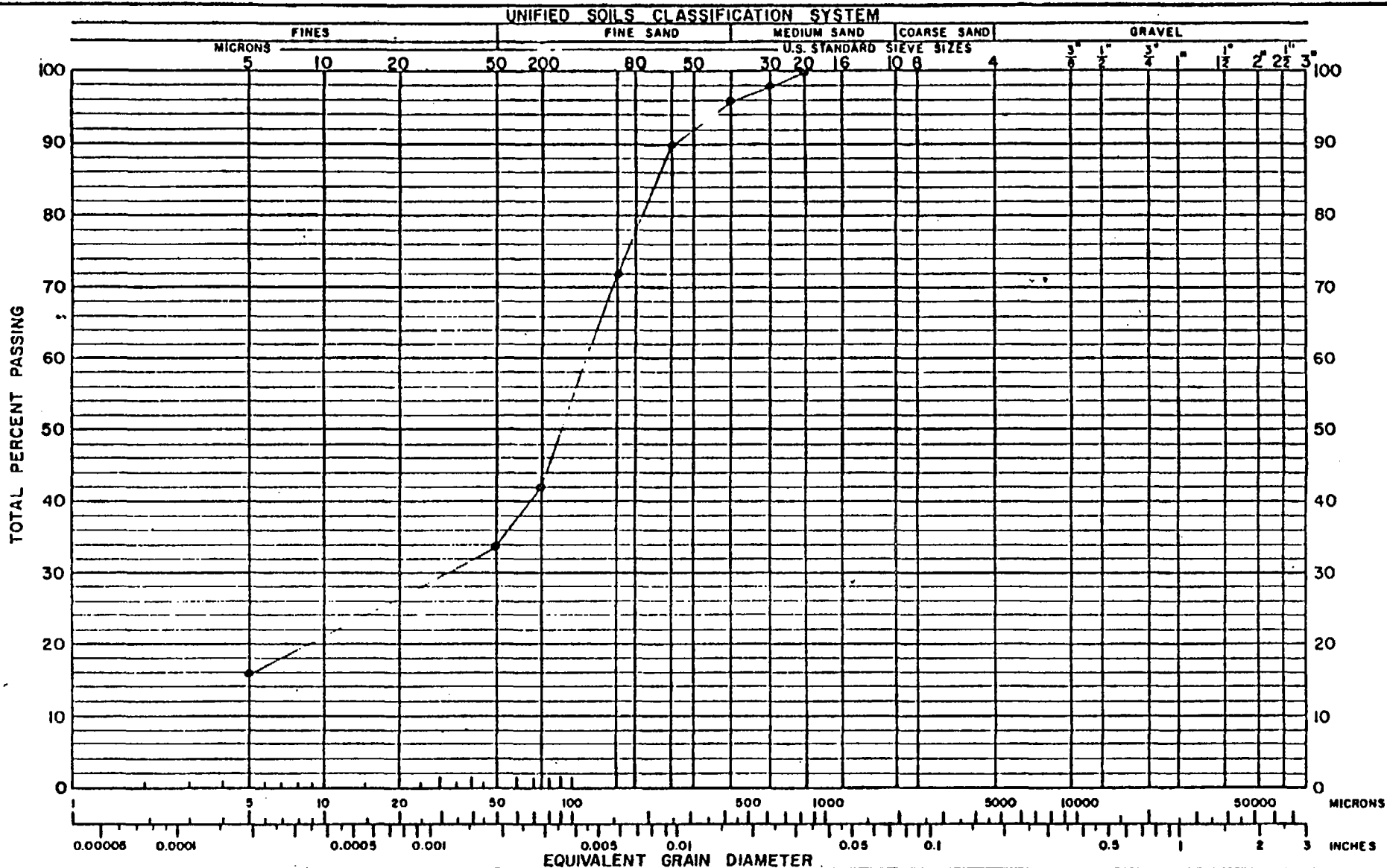
% Sand 66
 % Silt 16
 % Clay 18
 CLAYEY SAND (SC-SM)

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 21

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS



Sample Boring No. 20 Depth: 6.0'

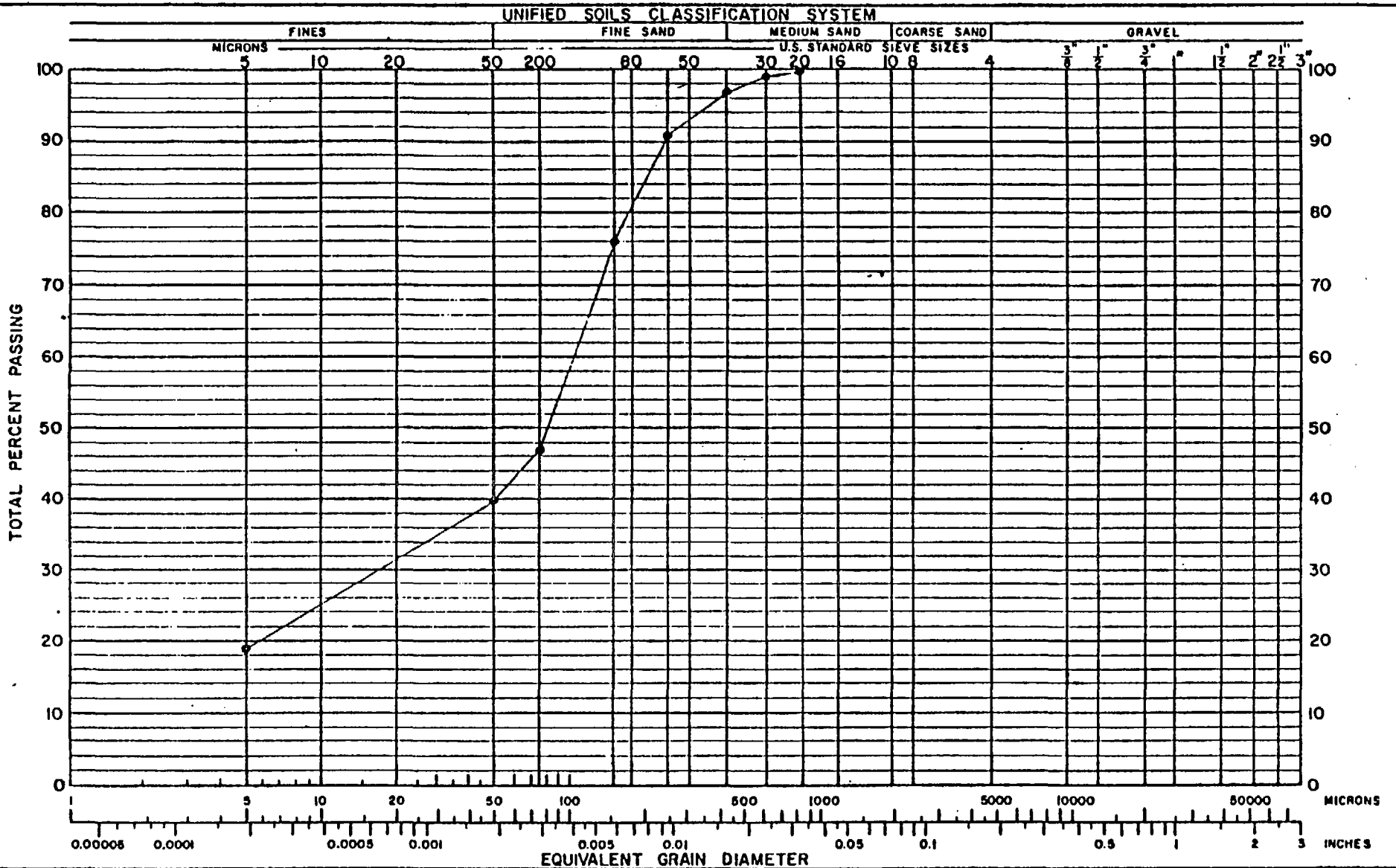
3/4 Sand 66
 3/4 Silt 18
 3/4 Clay 16
 CLAYEY SAND (SC-SM)

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 22

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS



Sample Boring No. 22 Depth: 4.0'

% Sand 60
 % Silt 21
 % Clay 19
 CLAYEY SAND (SC-SM)

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

GRADING ANALYSIS

PROJECT NO. 7298 DATE 9-11-72 PLATE NO. 23

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS

CABOT, CABOT & FORBES
C.C.&F. WESTERN DEVELOPMENT CO., INC.
SHELL CHEMICAL PLANT PROPERTY

ATTERBERG LIMITS

<u>Boring No.</u>	<u>Depth of Sample</u>	<u>Soil Class</u>	<u>Liquid Limit</u>	<u>Plastic Limit</u>	<u>Plasticity Index</u>
1	3.5	LEAN CLAY	37	17	20
3	3.5	SANDY CLAY	43	20	23
5	3.5	CLAYEY SAND	35	17	18
6	3.5	LEAN CLAY	36	16	20
6	13.5	SILTY SAND	20.7	N/A	N/A
16	4.5	SANDY CLAY	32	22	10

EXPANSION TEST AND DIRECT SHEAR TEST

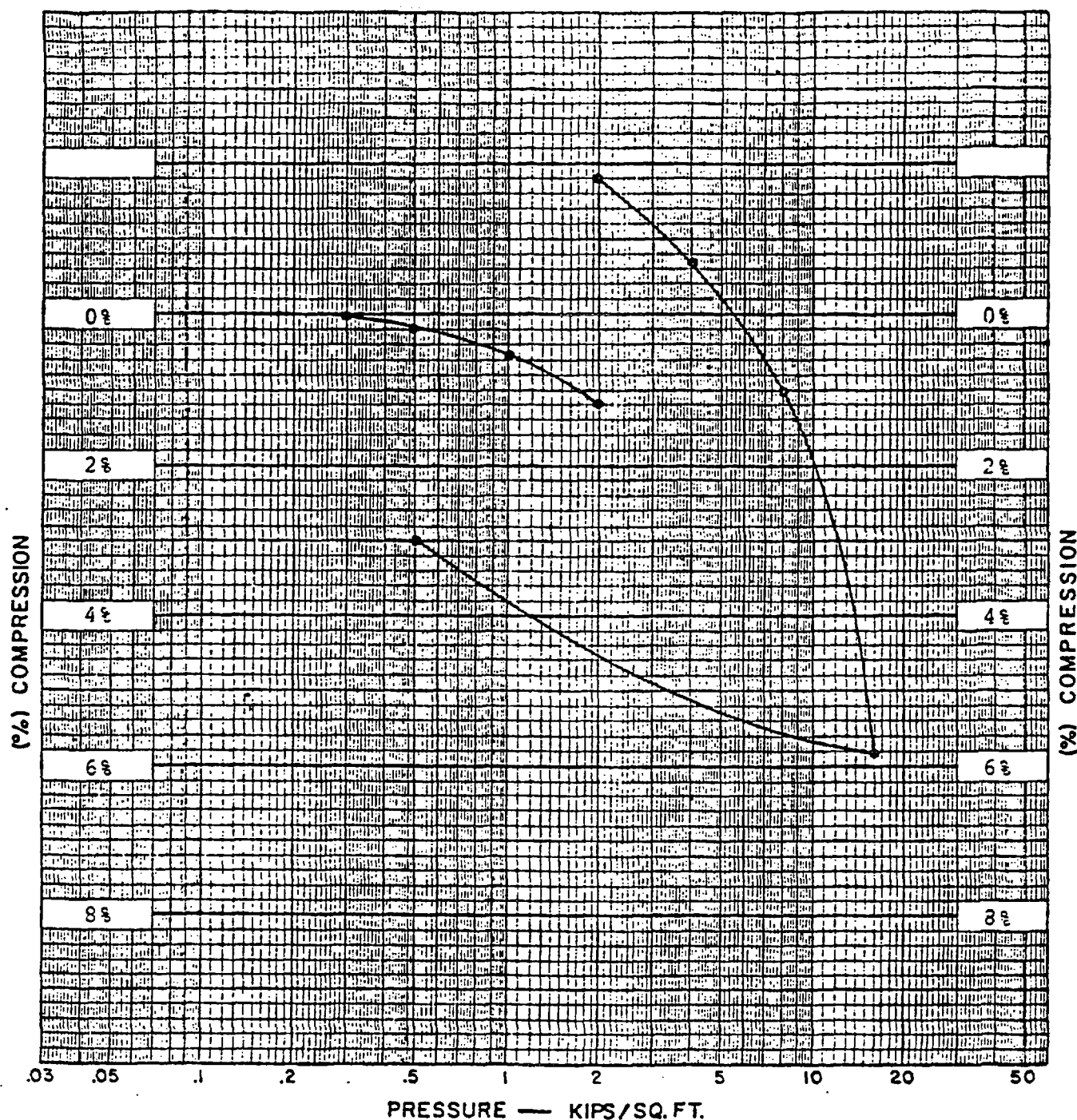
<u>Boring No.</u>	<u>Depth of Sample</u>	<u>Soil Class</u>	<u>Percent Expansion</u>	<u>Cohesion (lbs/ft²)</u>	<u>Angle of Internal Friction</u>
6	3.5	LEAN CLAY	0.95	1,200	24
7	3.5	CLAYEY SAND	0.44	1,100	26
10	8.5	CLAYEY SAND	0.75	900	30
11	8.5	SILTY SAND	0.23	800	32
15	8.5	CLAYEY SAND	0.75	1,400	26
16	4.5	SANDY CLAY	0.76	1,450	28
20	6.0	CLAYEY SAND	0.23	1,400	24
22	4.0	CLAYEY SAND	0.29	1,300	29

CABOT, CABOT & FORBES
C.C.&F. WESTERN DEVELOPMENT CO., INC.
SHELL CHEMICAL PLANT PROPERTY

UNCONFINED COMPRESSION TEST RESULTS

<u>Boring No.</u>	<u>Depth to Sample</u>	<u>Soil Classification</u>	<u>Strength--Ksf</u>
6	3.5'	LEAN CLAY	4.0
7	3.5'	CLAYEY SAND	8.8
10	8.5'	CLAYEY SAND	5.1
11	8.5'	SILTY SAND	8.8
15	8.5'	CLAYEY SAND	12.4
16	4.5'	SANDY CLAY	10.2
20	6.0'	CLAYEY SAND	3.1
22	4.0'	CLAYEY SAND	6.2

NOTE: Refer to Plate No's. 5 and 6 for boring locations and typical subsurface soil conditions.



TEST DATA

BORING NUMBER 6
 SAMPLE NUMBER
 DEPTH (FEET) 3.5
 CLASSIFICATION (CL-OL) LEAN CLAY
 HEIGHT (INCHES)
 DIAMETER (INCHES)
 INITIAL MOISTURE CONTENT (%) 16
 INITIAL DRY DENSITY (LB./CU. FT.) 113
 SPECIFIC GRAVITY
 FIN/ MOISTURE CONTENT (%)
 LIQUID LIMIT 35
 PLASTIC INDEX 20

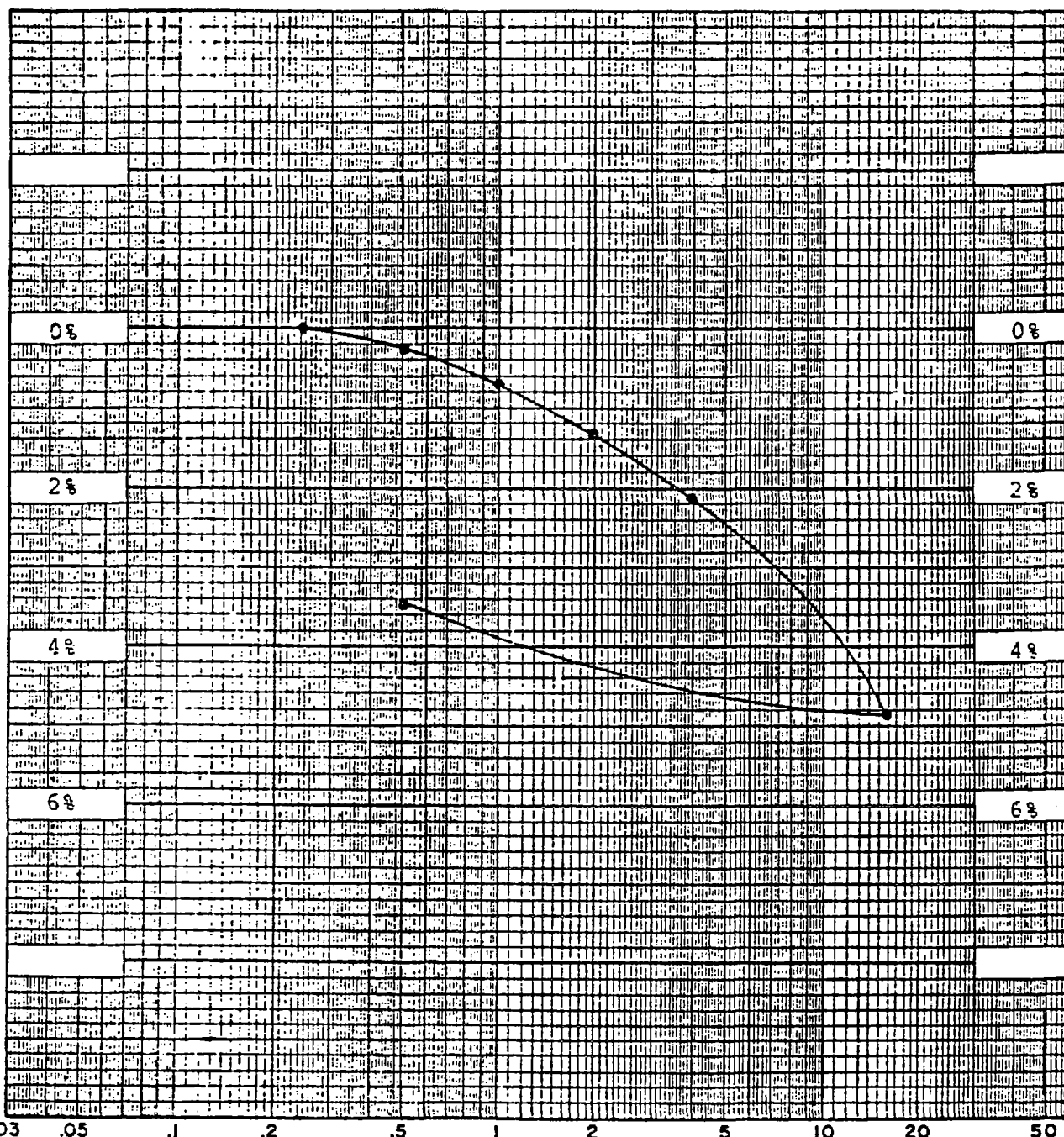
CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

CONSOLIDATION TEST

DR. BY:	DATE: 9/17/72	PROJECT	PLATE NO.
CHK. BY: W.D.	DATE:	7298	26

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS

(%) COMPRESSION



(%) COMPRESSION

PRESSURE — KIPS / SQ. FT.

TEST DATA

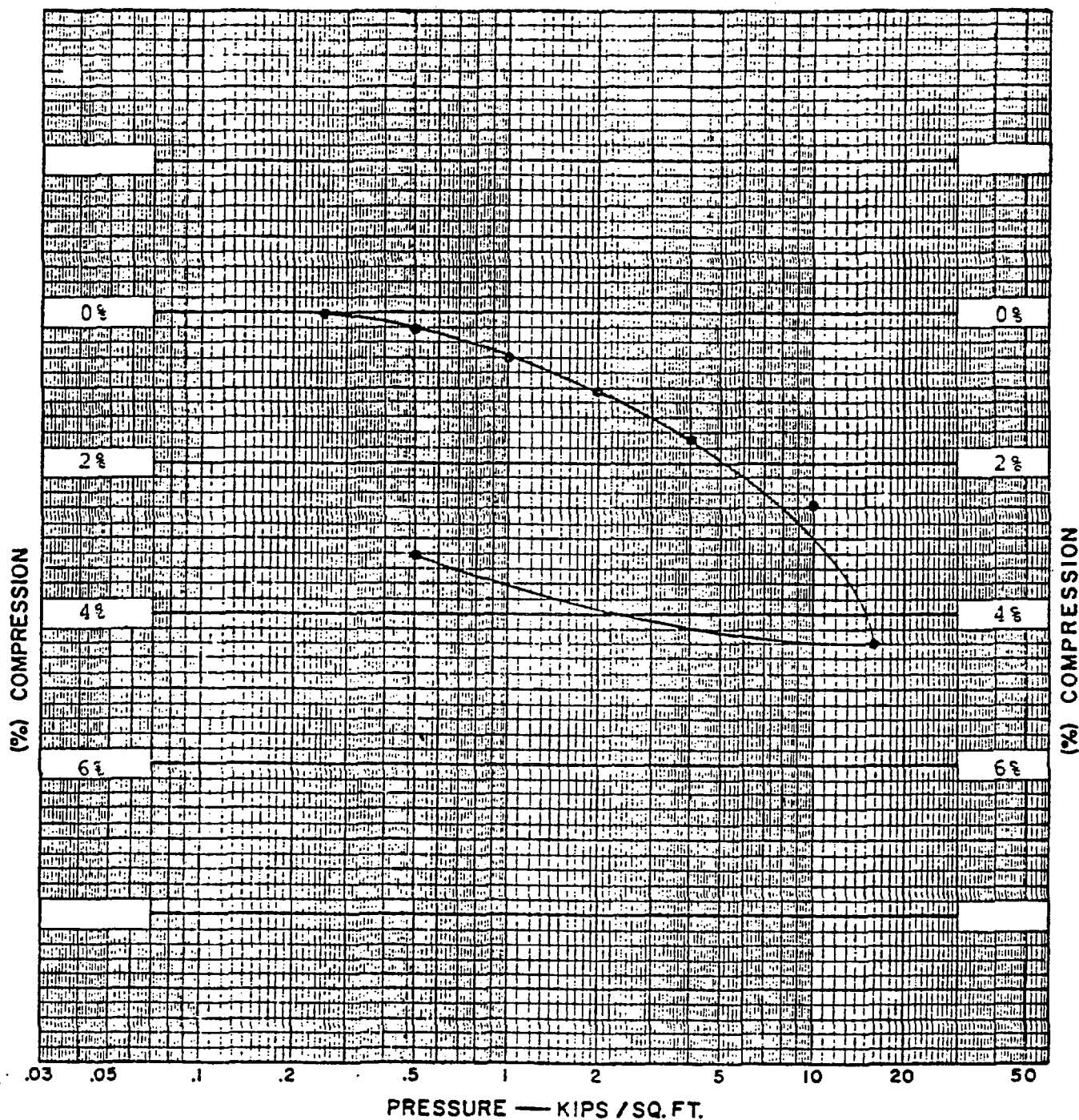
BORING NUMBER 6
 SAMPLE NUMBER
 DEPTH (FEET) 13.5
 CLASSIFICATION (SM) SILTY SAND
 HEIGHT (INCHES)
 DIAMETER (INCHES)
 INITIAL MOISTURE CONTENT (%) 13
 INITIAL DRY DENSITY (LB./CU. FT.) 110
 SPECIFIC GRAVITY
 FINAL MOISTURE CONTENT (%)
 LIQUID LIMIT
 PLASTIC INDEX

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

CONSOLIDATION TEST

DR. BY:	DATE:	PROJECT	PLATE NO.
CHK. BY: W.D.	DATE: 9/17/72	7298	27

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS



TEST DATA

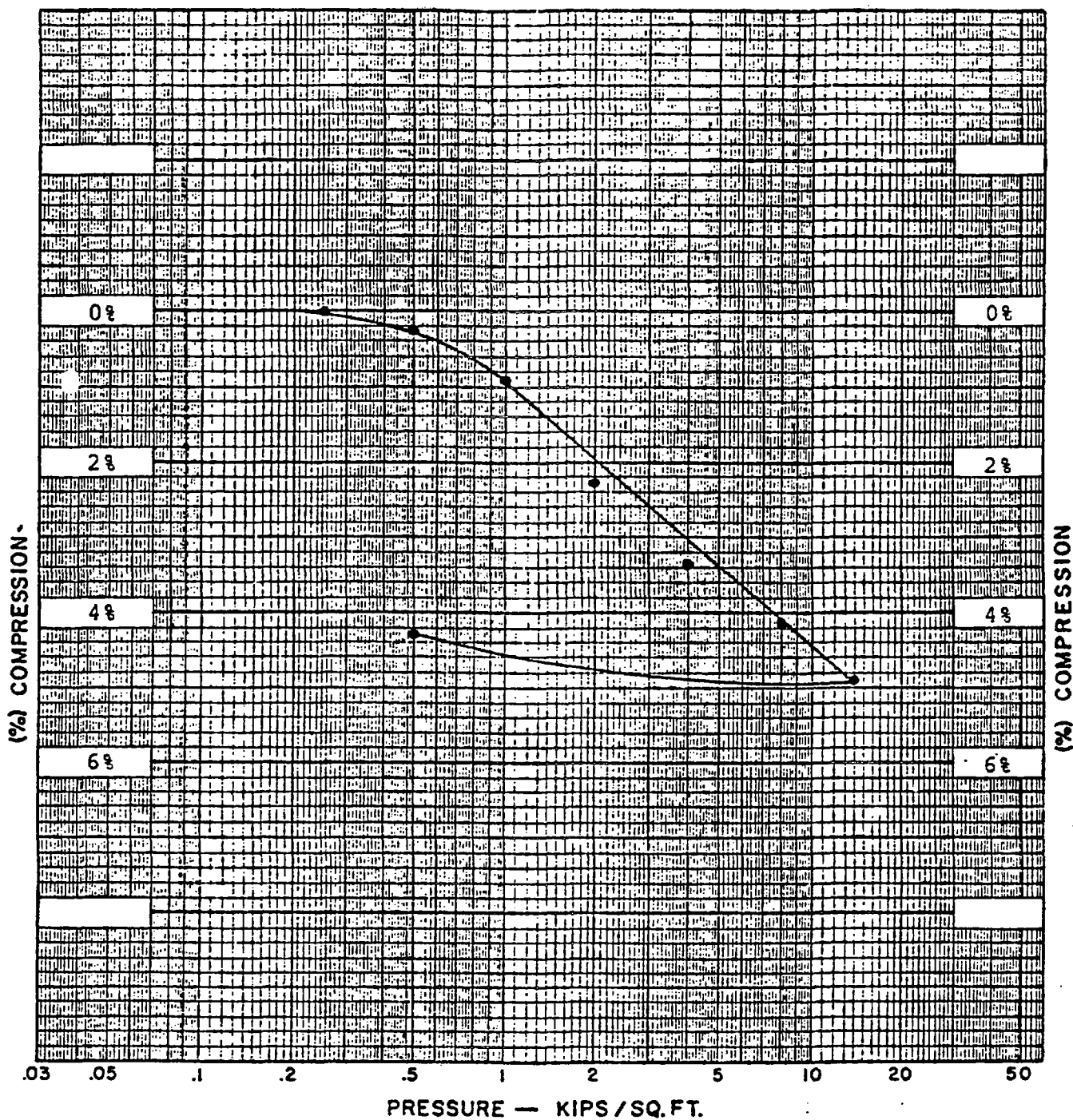
BORING NUMBER 15
 SAMPLE NUMBER
 DEPTH (FEET) 8.5
 CLASSIFICATION (SC-SM) CLAYEY SAND
 HEIGHT (INCHES)
 DIAMETER (INCHES)
 INITIAL MOISTURE CONTENT (%) 12
 INITIAL DRY DENSITY (L.B./CU. FT.) 117
 SPECIFIC GRAVITY
 FINAL MOISTURE CONTENT (%)
 LIQUID LIMIT
 PLASTIC INDEX

CABOT, CABOT & FORBES
 C.C.A.F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

CONSOLIDATION TEST

DR. BY:	DATE:	PROJECT	PLATE NO.
CHK. BY: U.D.	DATE: 9/17/72	7298	28

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS



TEST DATA

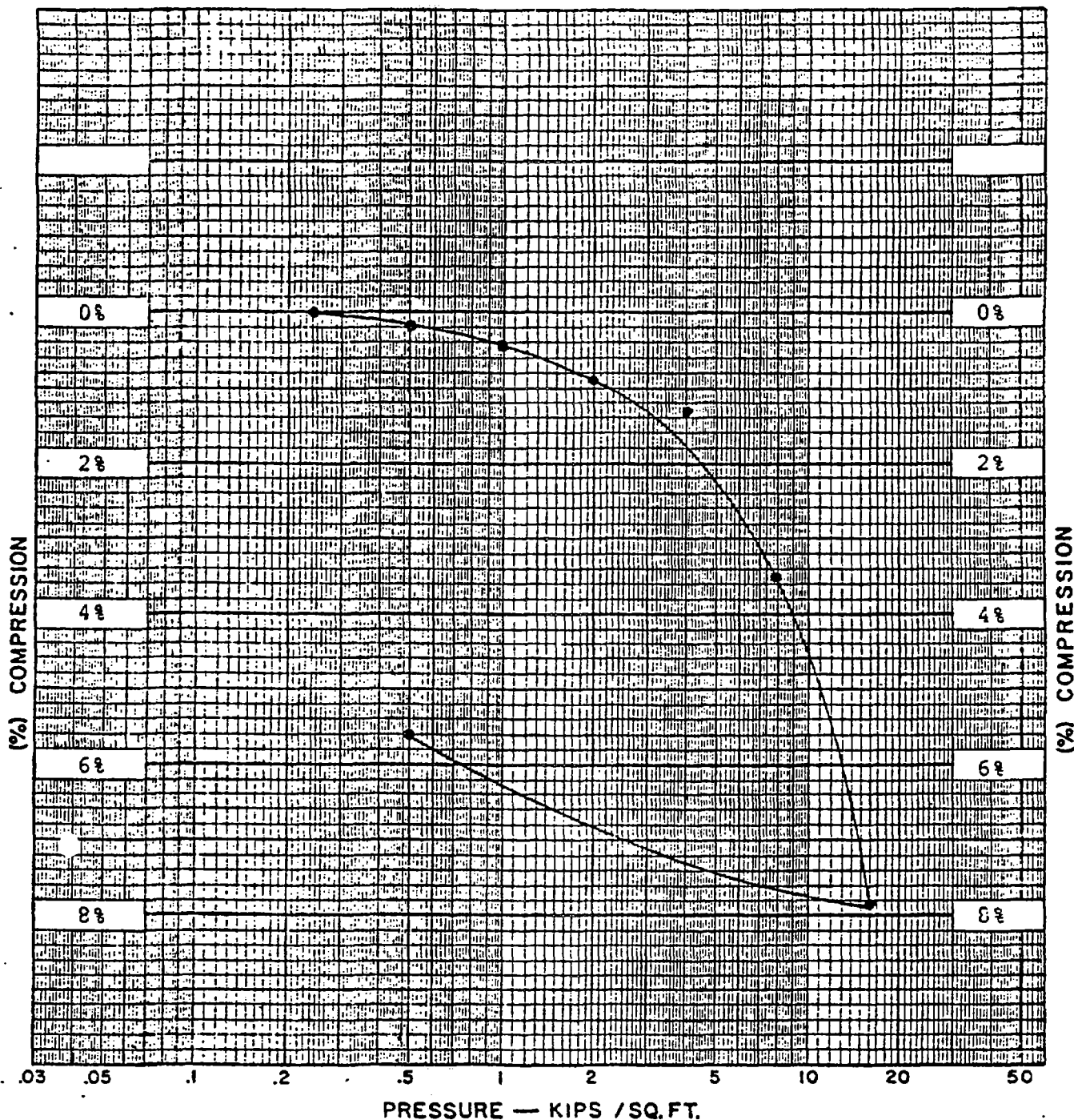
BORING NUMBER 16
 SAMPLE NUMBER
 DEPTH (FEET) 4.5
 CLASSIFICATION CL SANDY CLAY
 HEIGHT (INCHES)
 DIAMETER (INCHES)
 INITIAL MOISTURE CONTENT (%) 16
 INITIAL DRY DENSITY (LB./CU. FT.) 119
 SPECIFIC GRAVITY
 FINAL MOISTURE CONTENT (%)
 LIQUID LIMIT 32
 PLASTIC INDEX 10

CABOT, CABOT & FORBES
 C.C.&F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

CONSOLIDATION TEST

DR. BY:	W.D.	DATE:	9/17/72	PROJECT	PLATE NO.
CHK. BY:		DATE:		7298	29

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS



TEST DATA

BORING NUMBER 20
 SAMPLE NUMBER _____
 DEPTH (FEET) 6.0
 CLASSIFICATION (SC-SM) CLAYEY SAND
 HEIGHT (INCHES) _____
 DIAMETER (INCHES) _____
 INITIAL MOISTURE CONTENT (%) 16
 INITIAL DRY DENSITY (LB./CU. FT.) 111
 SPECIFIC GRAVITY _____
 FINAL MOISTURE CONTENT (%) _____
 LIQUID LIMIT _____
 PLASTIC INDEX _____

CABOT, CABOT & FORBES
 C.C.S.F. WESTERN DEVELOPMENT CO., INC.
 SHELL CHEMICAL PLANT PROPERTY

CONSOLIDATION TEST

DR. BY:	DATE:	PROJECT	PLATE NO.
CHK. BY: W.D.	DATE: 9/17/72	7298	30

KEN O'BRIEN & ASSOCIATES
 CONSULTING ENGINEERS

BORING LEGEND

SPT

Standard Penetration Test

Penetration Resistance - 3

Number of blows required to drive 1.50-inch I.D. split spoon sampler 6 inches with a 140-pound hammer falling 30 inches.

SS

2.43-inch I.D. split spoon sampler with 1-inch rings and/or 5- or 6-inch sleeves, utilizing a 4,000-pound Kelly as a reaction.

B

Bag Sample

(18)

Moisture Content - % dry weight

(SC-SM)

Unified Soil Classification

KEN O'BRIEN & ASSOCIATES CONSULTING ENGINEERS

LOG OF BORING 1

SHEET
1 OF 2

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 33.5'		DATE OF BORING STARTED 8-14-72 COMPLETED 8-14-72	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger		SAMPLES Disturbed/ Undisturbed		HAMMER 140 lbs falling 30"		DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.	
LOCATION: Refer to Plate No.							
1	LEAN CLAY: fine sand, silty, dark brown (CL-OL)	SS			(16)	117	moist
2							
3							
4							
5	CLAYEY/SILTY SAND: fine sand, light brown (SC-SM)	B			(15)	134	moist
6							
7							
8							
9	SILTY SAND: fine sand, clayey, slightly micaceous, several pea sized brown clay pebbles, light brown (SM-SC)	SS			(12)	105	moist
10							
11							
12							
13	SAND: fine sand, silty, micaceous, light brown (SW)	SS			(12)	105	moist
14							
15							
16							
17	SANDY CLAY: fine sand, slightly micaceous, light brown (CL)	B			(18)	105	moist to wet
18							
19							
20							
19		SS			(27)	105	wet
20							

PROJECT 7298		LOG OF BORING 1				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT % PL — NAT. — LL 1.0 2.0 3.0 4.0 5.0	DRY UNIT WEIGHT - PCF.	
20							
21	SANDY CLAY: fine sand, micaceous, light brown (CL)						
22							
23							
24		SS			•(35)	79	wet (?)
25							
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

LOG OF BORING 2

PROJECT CABOT, CABOT & FORBES
C.C.&F. WESTERN DEVELOPMENT CO., INC.
SHELL CHEMICAL PLANT PROPERTY

37.9'

STARTED	8-14-72
---------	---------

COMPLETED	8-14-72
-----------	---------

18" Bucket Auger

Disturbed/
Undisturbed

140 lbs
falling 30"

None

CLASSIFICATION OF MATERIALS
(in feet)

SYMBOL

PENETRATION

PENETRATION

MOISTURE CONTENT %

PL Δ \bullet NAT. \blacksquare LL

1.0 2.0 3.0 4.0 5.0

DRY UNIT

WEIGHT - PCF

LOCATION: Refer to Plate No.

CLAYEY SAND/SANDY CLAY:

1	heavily oil-saturated, brown
	to black, very viscous,
2	sticky, odorous (SC-CL-OL)

SS

174

123

-moist

Note:
bucket
sunk
without
pressure

hole caved
due to
viscous
tar matrix

Refusal on old concrete slab
± 4'x5'x6"

TOTAL DEPTH 13.0'

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING 3						SHEET 1 OF 2	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 40.2'		DATE OF BORING	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger				SAMPLES Disturbed/ Undisturbed		HAMMER 140 lbs falling 30"	
						DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE			DRY UNIT WEIGHT-PCF.
LOCATION: Refer to Plate No.							
1	CLAYEY SAND: fine sand, dark brown (SC)						dry
2	SANDY CLAY: fine sand, slightly micaceous, dark brown (CL)	B					moist
3							
4							
5		SS			(19)		111 moist to wet
6	SANDY CLAY/SANDY SILT: fine sand, micaceous, slightly lighter in weight, light tan to brown (CL-ML)						
7							
8							moist
9	SILTY SAND: fine to medium sand, micaceous, light tan to brown (SM)	SPT		13 15	(13)		
10							
11							
12							
13							
14		SS			(21)		115 moist to wet
15	SILTY SAND: fine sand, micaceous, clayey, light tan to brown (SM-SC)						
16							
17							
18							
19				6 9	(12)		moist
20		SPT		10			

PROJECT 7298		LOG OF BORING 3				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT-PCF.
					PL	NAT. LL	
20							
21	SILTY SAND: (continued)						
22	(SM-SC)						
23							
24		SS					moist
25							
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

KEN O'BRIEN & ASSOCIATES CONSULTING ENGINEERS

LOG OF BORING 4

SHEET
1 OF 1

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION 33.5'	DATE OF BORING	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger		HAMMER 140 lbs falling 30"	STARTED	8-14-72
			COMPLETED	8-14-72
SAMPLES Disturbed/ Undisturbed		DEPTH TO WATER None		

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT % PL NAT. LL 1.0 2.0 3.0 4.0 5.0	DRY UNIT WEIGHT - PCF.
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LOCATION: Refer to Plate No.

1	LEAN CLAY: fine sand, organic, silty, dark brown & black (CL-OL)					moist
2	SANDY CLAY/CLAYEY SAND: fine sand, silty, light					
3	brown (CL-SC)					
4		SS		• (15)		92-moist
5	SILTY SAND: fine sand, clayey, slightly micaceous,					
6	light brown (SM-SC)					
7						
8						
9			3			moist
10		SPT	6	• (16)		
11			8			
12		B		• (15)		
13						
14		SS		• (12)		116-moist
15						
16						
17						
18						
19			5			moist
		SPT	10	• (9)		
20			9			

PROJECT 7298		LOG OF BORING 4				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT - PCF.
					PL ▲	NAT. ●	
					1.0	2.0	3.0
					4.0	5.0	
20	SAND: fine to medium sand, slightly silty, micaceous, several friable sand pebbles (dry), trace of greenish clay residue, light brown (SW)						-moist
21							
22							
23							
24							
25		SS					
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

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CONSULTING ENGINEERS

LOG OF BORING 5						SHEET 1 OF 3		
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 36.7'		DATE OF BORING STARTED 8-15-72 COMPLETED 8-15-72		
TYPE & DESIGNATION OF DRILL 18" Bucket Auger		SAMPLES Disturbed/ Undisturbed		HAMMER 140 lbs falling 30"		DEPTH TO WATER None		
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE				DRY UNIT WEIGHT-PCF.
LOCATION: Refer to Plate No.								
1	CLAYEY SAND: fine sand, few small pebbles, silty, organic, dark brown & black (SC-SM)							-moist
2								
3								
4	--- color change to light brown	SS			• (18)	113	-moist to wet	
5								
6	SILTY SAND: fine sand, slight clay content, light brown, several limonite stained zones (SM)						-moist	
7								
8								
9								
10		SPT	11				-moist to wet	
11	12		• (11)					
12			16					
13	SILTY SAND: fine sand, several pea sized friable sand pebbles, micaceous, slight clay content, light brown (SM)	SS				121	-moist to wet	
14					• (17)			
15								
16								
17								
18	SANDY/SILTY CLAY: fine sand, several friable sand pebbles, micaceous, light brown (CL-ML)						-wet	
19		SPT	5					
20			8	• (30)				
			14					

PROJECT 7298		LOG OF BORING 5					SHEET 2 OF 3	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT-PCF.	
					PL NAT. LL			
					1.0	2.0 3.0 4.0 5.0		
20								
21	SANDY/SILTY CLAY: (continued) (CL-ML)						moist	
22								
23								
24								
25								
26								
27								
28	SILTY SAND: fine sand, micaceous, odorous, light green (SM)	B			•(19)		moist to wet	
29								
30	SAND: silty, fine to medium, micaceous, odorous, greenish tan becoming tan (SW)	SS			•(5)		dry	
31								
32								
33	SANDY CLAY: fine sand, micaceous, fine organics, limonite staining, light greenish tan (CL)							
34								
35	SILTY SAND: fine sand, mica- ceous, odorous, fine organic matter, greenish brown (SM)	SPT	6		•(17)		moist	
36			8					
37	SANDY SILT: clayey, fine sand, micaceous, limonite stains, odorous, light greenish brown (ML-CL)		11					
38								
39								
40	SILTY CLAY: fine sand, micaceous, odorous, limonite light greenish brown (CL-ML)	SS			•(27)		95 wet	
41								
42								
43	SHELL FRAGMENTS: dense, calcareous sandy shell bed, sand with friable shell fragments light tan & brown	B			•(6)		dry	
44								
45		SPT	10				refusal	

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LOG OF BORING 6										SHEET 1 OF 2		
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY					SURFACE ELEVATION 36.1'			DATE OF BORING				
TYPE & DESIGNATION OF DRILL 18" Bucket Auger					SAMPLES Disturbed/ Undisturbed			HAMMER 140 lbs falling 30"			STARTED 8-15-72	
								COMPLETED 8-15-72				
								DEPTH TO WATER None				
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)				SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE				DRY UNIT WEIGHT - PCF.	
LOCATION: Refer to Plate No.												
	GRASS SOD											
1	LEAN CLAY: fine to medium sand, organics, silty, dark brown (CL-OL)											-moist
2												
3												
4					SS						113	-moist to wet
5												
6	CLAYEY SAND: fine to medium sand, silty, color change to brown (SC-SM)											
7												
8												
9					SPT	4						
10						6						-moist to wet
11						8						
12	SILTY SAND: fine sand, micaceous, slight clay content, light brown (SM)											
13												
14					SS						110	-moist
15												
16												
17	SANDY CLAY: silty, micaceous, light brown (CL)											
18												
19					SPT	4						
20						5						
						10						

PROJECT 7298		LOG OF BORING 6				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT - PCF.
					PL	NAT. LL	
20							
21	SANDY CLAY: (continued)						-moist
22	numerous sand pebbles,						
23	friable, from pea size to						
	1/2", light brown (CL)						
24	CLAYEY SAND: fine to medium,	B		(9)			-moist
25	silty, micaceous, brown (SC-SM)						
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

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CONSULTING ENGINEERS

LOG OF BORING 7

SHEET
1 OF 2

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION 32.3'	DATE OF BORING STARTED 8-18-72 COMPLETED 8-18-72
TYPE & DESIGNATION OF DRILL 18" Bucket Auger	SAMPLES Disturbed/ Undisturbed	HAMMER 140 lbs falling 30"	DEPTH TO WATER None

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.	
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LOCATION: Refer to Plate No.

1	SAND/GRAVEL FILL: loose						
2	CLAYEY SAND: silty, fine to medium sand, dark brown (SC-SM)						
3	-----						
4	color change to brown	SS			• (10)	131	-moist
5	SILTY SAND: fine sand, micaceous, brown, variable clay content (SM-SC)						
6							
7							
8							
9							
10		SPT	6				
11			13		• (13)		-moist
12	-----		17				
13	color change to tan						
14		SS			• (7)		-moist to dry
15	SILTY/CLAYEY SAND: fine sand, limonite, micaceous, tan (SM-SC)						
16							
17							
18							
19	SANDY/CLAYEY SILT: very fine sand, micaceous, limonite-staining, tan	SPT	5				
20	(ML-CL)		8		• (24)		-moist to wet

PROJECT 7298		LOG OF BORING 7				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT - PCF.
					PL	NAT. LL	
					1.0	2.0	3.0
20							
21	SANDY/CLAYEY SILT: very fine sand, micaceous, limonite-staining (ML-CL)						
22							
23							
24							
25	numerous dark brown silty clay clods, moist to dry	B					
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

moist to
wet

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LOG OF BORING 8

SHEET
1 OF 3

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION 30.3'	DATE OF BORING <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">STARTED</td> <td>8-21-72</td> </tr> <tr> <td>COMPLETED</td> <td>8-21-72</td> </tr> </table>	STARTED	8-21-72	COMPLETED	8-21-72
STARTED	8-21-72						
COMPLETED	8-21-72						
TYPE & DESIGNATION OF DRILL 18" Bucket Auger	SAMPLES Disturbed/ Undisturbed	HAMMER 140 lbs falling 30"	DEPTH TO WATER None				

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT-PCF.	
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LOCATION: Refer to Plate No.

1	SAND GRAVEL: fill material, reddish brown						
2	SANDY CLAY: silty, dark brown organic matter (black) (CL-OL)	SPT	10			127	-moist
3			10				
4			14				
5	CLAYEY SAND: silty, fine to medium sand, reddish brown (SC-SM)						
6							
7							
8	SILTY SAND: clayey, fine to medium sand, reddish brown changing to brown, slightly micaceous (SC-SM)	SS		(10)		127	-moist
9							
10							
11							
12							
13							
14		SPT	6			127	-moist
15			9	(12)			
16			12				
17							
18							
19							
20	SAND: silty, light brown, slightly gaseous odor (SW)	SS		(12)		109	-moist
	SILTY/CLAYEY SAND: fine, micaceous, brown (SM-SC)						

PROJECT 7298		LOG OF BORING 8				SHEET 2 OF 3	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT % PL NAT. LL 1.0 2.0 3.0 4.0 5.0	DRY UNIT WEIGHT - PCF.	
20	SILTY/CLAYEY SAND:						
21	(continued) (SM-SC)						
22							moist
23	SILTY SAND: fine to medium						
24	sand, micaceous, slight gas						
25	odor, limonite, variable						
26	clay & silt content, brown						
27	(SM)						
28	SAND: silty, micaceous,						
29	fine to medium sand, very						
30	odorous (variable in zones)						
31	(SW)						
32							
33	SAND: silty, micaceous,						
34	fine to medium sand, micaceous,						
35	limonite, brown (SM-SC)						
36							
37							
38							
39							
40	SILTY/CLAYEY SAND: fine to						
41	medium sand, micaceous,						
42	limonite, brown (SM-SC)						
43							
44							
45							

PROJECT 7298		LOG OF BORING 8			SHEET 3 OF 3	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL PENETRATION RESISTANCE	MOISTURE CONTENT % P.L. NAT. LL 1.0 2.0 3.0 4.0 5.0	DRY UNIT WEIGHT - PCF.	
45						
46	SILTY SAND/SANDY SILT: fine to medium sand, micaceous, slightly odorous, heavy limonite staining, vari-colored gray-green-brown (SM-ML)	SS		● (19)	100	-moist to wet
47						
48						
49						
50						
51						
52						
53						
54						
55	SAND: silty, fine to medium, micaceous, limonite, heavy odor, greenish gray (SW) shell fragments					-moist to wet
56						
57						
58	CLAY: silty, odorous, micaceous, limonite staining, fine sand, brown (CL)					-dry to moist
59						
60						
TOTAL DEPTH 60.0'						

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LOG OF BORING 9						SHEET 1 OF 2	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 26.1'		DATE OF BORING	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger				SAMPLES Disturbed/ Undisturbed		HAMMER 140 lbs falling 30"	
						DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE			DRY UNIT WEIGHT - PCF.
LOCATION: Refer to Plate No.							
	SURFACE GRAVEL: loose						
1	SANDY CLAY: fine sand, dark brown						-moist
2	SANDY CLAY: color change to brown (CL)						
3							
4		SS			• (16)	108	-moist
5							
6							
7	CLAYEY SAND: silty, micaceous, fine grained, brown (SC-SM)						
8							
9	SILTY SAND: fine sand, micaceous, minor clay content, brown (SM)	SPT	6		• (11)		-moist
10			12				
11			13				
12	slight gaseous odor						
13							
14		SS			• (11)		-moist
15							
16	SAND: silty, fine to medium, micaceous, light tan (SW)						
17	CLAYEY SAND: fine to medium micaceous, limonite, brown (SC)						
18	SANDY SILT: clayey, fine to medium sand, micaceous, (gas) odorous, greenish brown (ML-CL)	SPT	7				-moist
19			7				
20	color change to green		10				

PROJECT 7298		LOG OF BORING 9				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT-PCF.
					PL	NAT. LL	
20							
21	SANDY SILT: fine to medium sand, micaceous, limonite stains, heavy gas odor, greenish brown (ML-CL)						-moist
22							
23							
24	SILTY SAND: fine to medium sand, clayey, micaceous, limonite, gas odor, greenish brown (SM-SC)						-moist
25							
26	SAND: fine to medium, tan (SW)						
27	TOTAL DEPTH 25.0'						
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING 10

SHEET
1 OF 2

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION 31.1'	DATE OF BORING STARTED 8-18-72 COMPLETED 8-18-72	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger	SAMPLES Disturbed/ Undisturbed	HAMMER 140 lbs falling 30"	DEPTH TO WATER None	

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.
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LOCATION: Refer to Plate No.

	SURFACE GRAVEL: loose																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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PROJECT 7298		LOG OF BORING 10				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE			DRY UNIT WEIGHT-PCF.
20	SANDY/CLAYEY SILT: fine sand, micaceous, odorous, tan (ML-CL)						
21							
22							
23	CLAYEY SAND: silty, micaceous, limonite stained, fine sand, tan, odorous (SC-SM)	SS			• (27)	97 -wet	
24							
25							
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

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LOG OF BORING 11						SHEET 1 OF 2	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 35.0'		DATE OF BORING	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger				SAMPLES Disturbed/ Undisturbed		HAMMER 140 lbs falling 30"	
						DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.	
LOCATION: Refer to Plate No.							
1	ASPHALT CONCRETE: dense						-moist
2	SANDY CLAY: silty, fine to medium sand, organics, scattered friable sand pebbles, dark brown (CL-ML)						
3							
4		SPT	4	4	• (15)		-moist
5							
6	color change to light brown						
7							
8	SILTY SAND: clayey, fine sand, very fine mica, light brown (SM-SC)						
9		SS			• (11)	123	-moist
10							
11							
12	limonite staining						
13							
14							
15	SAND: silty, fine to medium sand, micaceous, tan (SW)	SPT	6	7	• (9)		-moist
16				9			
17	SILTY SAND: fine sand, micaceous, fine organics, limonite, several hard (+) 2" inclusions, light tan (SM)						
18							
19		SS			• (18)		-moist to wet
20							

PROJECT 7298		LOG OF BORING II				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT-PCF.
					PL	LL	
20							
21	SILTY SAND: (continued) (SM)						-moist to wet
22							
23							
24		B			•(13)		
25							
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

LOG OF BORING 12

DEPTH TO WATER	None
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BORING NO. 12

PROJECT 7298		LOG OF BORING 12				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT - PCF.
					PL	NAT. LL	
20	SILTY/CLAYEY SAND: (continued) (SM-SC)						wet
21							
22							
23							
24							
25	SILTY SAND: fine green (SM) TOTAL DEPTH 25.0'						wet
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

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LOG OF BORING 13

SHEET
1 OF 2

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION 42.4'	DATE OF BORING	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger			SAMPLES Disturbed/ Undisturbed	STARTED 8-16-72
		HAMMER 140 lbs falling 30"	COMPLETED 8-16-72	
		DEPTH TO WATER None		

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT % PL NAT. LL 1.0 2.0 3.0 4.0 5.0	DRY UNIT WEIGHT-PCF.
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LOCATION: Refer to Plate No.

1	SANDY CLAY: fine sand, few sand pebbles (friable), dark brown, minor organic (black) (CL-OL)						-moist
2							
3							
4	color change to light brown with mica (CL)	SPT	2				
5			5		• (20)		-moist to wet
6			6				
7							
8							
9		SS			• (16)	121	-moist
10	SILTY SAND: clayey, fine sand, micaceous, light brown (SM-SC)						
11							
12							
13							
14		SPT	6				
15			6		• (14)		-moist
16			7				
17							
18							
19	SILTY CLAY: fine sand, micaceous, light brown	SS			• (12)	104	
20							limonite stains (CL)

PROJECT 7298		LOG OF BORING 13				SHEET 2 OF 2			
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT-PCF.		
					PL	NAT. LL			
					1.0	2.0	3.0	4.0	5.0
20									
21	SILTY CLAY: (continued)								-moist
22	(CL)								
23									
24									
25									
	TOTAL DEPTH 25.0'								
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
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41									
42									
43									
44									
45									

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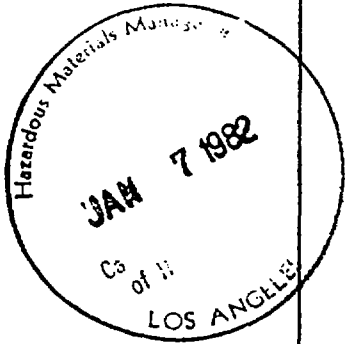
LOG OF BORING 14

SHEET
1 OF 2

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION 42.4'		DATE OF BORING STARTED 8-16-72 COMPLETED 8-16-72	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger		SAMPLES Disturbed/ Undisturbed		HAMMER 140 lbs falling 30"	
				DEPTH TO WATER None	

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT % PL NAT. LL 1.0 2.0 3.0 4.0 5.0	DRY UNIT WEIGHT - PCF.
1	SAND/CLAY/SILT: fill material--concrete, rubble, etc. (CL-ML)					-dry
2						-moist
3	CLAYEY SAND: fine to medium sand, silty, dark brown, black organics (SC-SM)					
4		SS		• (16)	118	-moist
5	color change to brown with mica					
6						
7						
8						
9	CLAYEY SAND: silty, micaceous, fine to medium sand, very dense, limonite, brown (SC-SM)					
10		SPT	6 12 27	• (18)		-moist to wet
11						
12						
13	SAND: slight silt content, fine grained, micaceous, limonite stained, brown (SW)					
14		SS		• (9)	123	-moist
15						
16						
17						
18	SAND: silty, clayey, micaceous, limonite, brown (SW)					
19		SPT	12 16 18	• (14)		-moist
20						

PROJECT 7298		LOG OF BORING 14			SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL PENETRATION RESISTANCE			DRY UNIT WEIGHT-PCF.
20						
21	SAND: (continued) (SW)					moist
22						
23						
24						
25						
26	TOTAL DEPTH 25.0'					
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						



LOG OF BORING 15

PROJECT CABOT, CABOT & FORBES
C.C.&F. WESTERN DEVELOPMENT CO., INC.
SHELL CHEMICAL PLANT PROPERTY

DATE OF BORING	
STARTED	8-17-72
COMPLETED	8-17-72

SAMPLES
Disturbed/
Undisturbed

HAMMER
140 lbs
falling 30"

DEPTH TO WATER
None

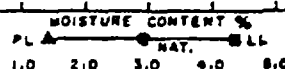
DEPTH FROM SURFACE

CLASSIFICATION OF MATERIALS
(in feet)

SYMBOL

SAMPLE INTERVAL

**PENETRATION
RESISTANCE**



DRY UNIT
WEIGHT - PCF.

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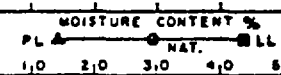
PROJECT 7298		LOG OF BORING 15				SHEET 2 OF 3	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT % PL NAT. LL 1.0 2.0 3.0 4.0 5.0		DRY UNIT WEIGHT-PCF.
20	CLAYEY SAND: fine sand, silty, micaceous, limonite stains (SC-SM) fine white lime(?) inclusions	SPT	7				-wet
21			12				
22			14				
23							
24							
25		B					-moist
26	SILTY SAND: fine, micaceous, minor clay, brown (SM)						
27							
28							
29	SAND: fine sand, clean, micaceous, tan, several pea sized clay lumps (SW)	SS					117 -moist to dry
30							
31							
32							
33							
34		SPT	8				-moist
35	14						
36	SILTY/CLAYEY SAND: (SM-SC) SAND/SILT/CLAY: mixed, micaceous, limonite stained clay lumps (+) pea sized, mottled tan & brown (SM-SC)		12				
37							
38							
39	SILTY/CLAYEY SAND: fine, micaceous, limonite stained, brown, clay lumps to 1" (SM-SC)	B					-moist
40							
41							
42		SS					96 -moist to wet
43							
44	SILTY/SANDY CLAY: calcareous, limonite, micaceous, numerous shell fragments, greenish tan (CL-ML)						
45							

PROJECT 7298		LOG OF BORING 15				SHEET 3 OF 3	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT % PL 1.0 2.0 3.0 4.0 5.0 NAT. LL	DRY UNIT WEIGHT - PCF.	
45	SILTY/SANDY CLAY:						
46	(continued) (CL-ML)						
47	CLAY: calcareous, numerous shell fragments, limonite, greenish tan (CL)	B			(15)		moist
48							
49	COQUINA: numerous fragments dense, well cemented, brown to tan						
50	SILTY SAND: fine, micaceous, reddish brown (SM)						
51	TOTAL DEPTH 51.0'						

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LOG OF BORING 16

SHEET
1 OF 2

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 36.0'		DATE OF BORING STARTED 8-17-72 COMPLETED 8-17-72	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger		SAMPLES Disturbed/ Undisturbed		HAMMER 140 lbs falling 30"		DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF	
LOCATION: Refer to Plate No.							
	GRASS: sod-roots						-moist
1	SANDY CLAY: fine sand, silty, organics (roots), dark brown (CL-OL)						
2							
3							
4							
5	SANDY CLAY: fine sand, silty, variable sand content, micaceous, reddish brown (CL)	SS			• (17)	118	-moist
6		E			• (18)		-moist to wet
7							
8							
9		SPT	5				
10			4		• (16)		-moist
11			6				
12							
13							
14							
15							
16							
17	SILTY/CLAYEY SAND: fine to medium, several clay lumps, micaceous, reddish brown (SM-SC)						
18							
19							
20							
19	SILTY SAND: fine to medium sand, micaceous, limonite, light brown (SM)	SS			• (11)	113	-moist
20							

PROJECT 7298		LOG OF BORING 16				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE			DRY UNIT WEIGHT - PCF.
20	SILTY SAND: (continued)						
21	(SM)						
22							
23	-----						
24	scattered clay lumps, greater clay content (SM-SC)	B			(19)		-moist to wet
25	TOTAL DEPTH 25.0'						
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

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CONSULTING ENGINEERS

LOG OF BORING 17

SHEET
1 OF 2

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 37.5'		DATE OF BORING STARTED 8-17-72 COMPLETED 8-17-72		
TYPE & DESIGNATION OF DRILL 18" Bucket Auger		SAMPLES Disturbed/ Undisturbed		HAMMER 140 lbs falling 30"		DEPTH TO WATER None		
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)			SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	DRY UNIT WEIGHT - PCF.	
LOCATION: Refer to Plate No.								
	SURFACE GRAVEL: loose							
1	SAND: silty, clayey, dark brown (SW)						-moist	
2								
3								
4	SANDY CLAY: silty, red (CL)			SS		• (15)	119 -moist	
5	SILTY SAND: slight clay content, fine sand, several small clay lumps (+) 1/2", reddish brown (SM)						-moist	
6								
7								
8								
9				SPT	5	• (15)		
10	increased clay content (SM-SC)			B		• (14)	-moist	
11								
12								
13							-moist	
14				SS		• (13)		123
15								
16							-moist	
17								
18								
19	SILTY SAND: fine to medium sand, micaceous, limonite stains, light brown (SM)			SPT	8	• (10)	-moist	
20					13			
					15			

PROJECT 7298		LOG OF BORING 17				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT % PL NAT. LL 1.0 2.0 3.0 4.0 5.0	DRY UNIT WEIGHT - PCF.	
20							
21	SILTY SAND: fine to medium sand, variable clay content, micaceous, light brown, several 2" sized brown clay inclusions (SM)						-moist
22							
23							
24							
25							
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
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KEN O'BRIEN & ASSOCIATES
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LOG OF BORING 18

SHEET
1 OF 2

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 37.7'		DATE OF BORING STARTED 8-18-72 COMPLETED 8-18-72	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger		SAMPLES Disturbed/ Undisturbed		HAMMER 140 lbs falling 30"		DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.	
LOCATION: Refer to Plate No.							
1	SURFACE GRAVEL: loose						-dry
2	SILTY SAND: fine sand, hard, dark brown clay clods (broken fragments), mica- ceous, red (SM-SC)						-dry to moist
3	----- gradational color change to brown						-moist
4		SS			• (13)	116	
5							
6							
7							
8							
9		SPT		10 10 15	• (13)		-moist
10							
11	SAND: fine to medium sand, micaceous, numerous silty clay lumps, brown (SP)						
12							
13							
14		B			• (7)		-moist to dry
15							
16							
17							
18	--- color change to light brown						
19		SS			• (14)	116	-moist
20							

PROJECT 7298		LOG OF BORING 18				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT - PCF.
					PL ▲	NAT. ●	
					1.0	2.0	3.0
					4.0	5.0	
20	SAND: (continued) (SP) (homogeneous)						-moist
21							
22							
23							
24							
25		B				• (11)	
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

Hazardous Materials Division
JAN 7 1982
SHEET
1 OF

SHEET
1 OF

K O A P O R T - 16

BORING NO. 19
PLATE NO. 49

PROJECT 7298		LOG OF BORING 19				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT-PCF.
					PL	NAT. LL	
20							
21	SILTY SAND: (continued)						-moist
22	(SM-SC)						
23							
24							
25							
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING 20

SHEET
1 OF 2

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION <p style="text-align: center;">32.5'</p>	DATE OF BORING <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">STARTED</td> <td style="width: 50%;">8-21-72</td> </tr> <tr> <td>COMPLETED</td> <td>8-21-72</td> </tr> </table>	STARTED	8-21-72	COMPLETED	8-21-72
STARTED	8-21-72						
COMPLETED	8-21-72						
TYPE & DESIGNATION OF DRILL <p style="text-align: center;">18" Bucket Auger</p>	SAMPLES <p style="text-align: center;">Disturbed/ Undisturbed</p>	HAMMER <p style="text-align: center;">140 lbs falling 30"</p>	DEPTH TO WATER <p style="text-align: center;">None</p>				

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT-PCF.	
--------------------	--	--------	-----------------	------------------------	--	----------------------	--

LOCATION: Refer to Plate No.

1	SAND/GRAVEL: loose						
2	SILTY/SANDY CLAY: fine sand, fill material, soft, dark brown (CL-ML)						-moist
3							
4							
5							
6	CLAYEY SAND: silty, fine to medium sand, brown (SC-SM)						-moist
7		SS		•(16)		111	
8	SILTY SAND: clayey, fine sand, brown (SM-SC)						-moist
9							
10							
11							
12							
13							
14	SILTY SAND: fine sand, mica-ceous, brown, clayey (SM-SC)	SPT	5				
15			8	•(13)			-moist
16			8				
17							
18							
19							
20							

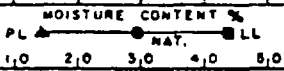
PROJECT 7298		LOG OF BORING 20				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT - PCF.
					PL	NAT. LL	
20	SILTY SAND: clayey, mica- ceous, fine grained, limonite stained, brown (SM-SC)	SS					97 wet
21							
22							
23							
24							
25	TOTAL DEPTH 25.0'						
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

SHEET
1 OF 2

U. S. G. A. 70888-16

PROJECT 7298		LOG OF BORING 21				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT-PCF.
					PL	NAT. LL	
20							
21	SAND: silty, scattered clay inclusions, fine sand, micaceous, brown (SW-SP)						-moist
22							
23							
24							
25							
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING 22						SHEET 1 OF 2	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 31.6'		DATE OF BORING STARTED 8-22-72 COMPLETED 8-22-72	
TYPE & DESIGNATION OF DRILL 18" Bucket Auger		SAMPLES Disturbed/ Undisturbed		HAMMER 140 lbs falling 30"		DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE			DRY UNIT WEIGHT - PCF.
LOCATION: Refer to Plate No.							
1	SAND/GRAVEL: loose CLAYEY SAND: silty, organics, fine sand, dark brown (SC-SM)						-moist
2							
3							
4							
5	color change to reddish brown	SS			(14)	116	-moist
6							
7							
8							
9							
10							
11	SILTY SAND: fine sand, brown, slightly clayey (SM)						-moist
12							
13							
14							
15							
16							
17							
18							
19	SILTY/CLAYEY SAND: fine sand, micaceous, scattered hard clay inclusions, brown (SM-SC)	SS			(11)		-moist
20							

PROJECT 7298		LOG OF BORING 22				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT - PCF.
					PL	NAT. LL	
					1.0 2.0 3.0 4.0 5.0		
20							
21	SILTY/CLAYEY SAND: (continued)						-moist 93
22	SANDY/SILTY CLAY: fine sand, micaceous, brown (CL-ML)						
23							
24		SS			•(26)		
25							
26	TOTAL DEPTH 25.0'						
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING IX

SHEET
1 OF 1

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 33.7'		DATE OF BORING STARTED 8-22-72 COMPLETED 8-22-72		
TYPE & DESIGNATION OF DRILL 24" Bucket Auger		SAMPLES None		HAMMER None		DEPTH TO WATER None		
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)			SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.
LOCATION: Refer to Plate No.								
1	SANDY CLAY: fine sand, silty, dark brown (CL-OL)							-moist
2								
3								
4	SANDY CLAY: fine sand, silty, reddish brown (CL)							-moist
TOTAL DEPTH 4.0'								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

KEN O'BRIEN & ASSOCIATES
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LOG OF BORING 1A

SHEET *
1 OF 1

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION <p style="text-align: center;">34.4'</p>	DATE OF BORING <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">STARTED</td> <td style="width: 50%;">8-22-72</td> </tr> <tr> <td>COMPLETED</td> <td>8-22-72</td> </tr> </table>	STARTED	8-22-72	COMPLETED	8-22-72
STARTED	8-22-72						
COMPLETED	8-22-72						
TYPE & DESIGNATION OF DRILL <p style="text-align: center;">24" Bucket Auger</p>	SAMPLES <p style="text-align: center;">None</p>	HAMMER <p style="text-align: center;">None</p>	DEPTH TO WATER <p style="text-align: center;">None</p>				

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.
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LOCATION: Refer to Plate No.

1	SANDY CLAY: silty, fine sand, dark brown (CL-OL)					-moist
2						
3						
4	OIL-SATURATED CLAY: fine sand, silty, dark brown to black (OL)					-moist
5						
6	SANDY CLAY: silty, fine sand, reddish brown (CL)					
7	TOTAL DEPTH 6.0'					
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

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LOG OF BORING 1B

SHEET
1 OF 1

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION <p style="text-align: center;">34.7'</p>	DATE OF BORING <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">STARTED</td> <td>8-22-72</td> </tr> <tr> <td>COMPLETED</td> <td>8-22-72</td> </tr> </table>	STARTED	8-22-72	COMPLETED	8-22-72
STARTED	8-22-72						
COMPLETED	8-22-72						
TYPE & DESIGNATION OF DRILL <p style="text-align: center;">24" Bucket Auger</p>	SAMPLES <p style="text-align: center;">None</p>	HAMMER <p style="text-align: center;">None</p>	DEPTH TO WATER <p style="text-align: center;">None</p>				

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT-PCF.	
--------------------	--	--------	-----------------	---------------------------	--	-------------------------	--

LOCATION: Refer to Plate No.


1	OIL-SATURATED CLAY: fine sand, silt, heavily oil saturated, odorous, dark brown, organic (CL-OL)						-moist
2							
3							
4							
5							
6	SANDY CLAY: fine sand, silty, reddish brown (CL)						-moist
7							
8							
9							
10							
11	TOTAL DEPTH 10.0'						
12							
13							
14							
15							
16							
17							
18							
19							
20							

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LOG OF BORING 1C						SHEET 1 OF 1	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 35.1'		DATE OF BORING	
TYPE & DESIGNATION OF DRILL 24" Bucket Auger				SAMPLES None		HAMMER None	
						DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT-PCF.	
LOCATION: Refer to Plate No.							
1	SANDY CLAY: fine sand, silty, dark brown (CL-OL)						
2							
3	OIL-SATURATED CLAY: fine sand, silty, odorous, brown to black (OL)						-moist
4							
5							
6	SANDY CLAY: silty, fine sand, reddish brown (CL)						-moist
	TOTAL DEPTH 6.0'						
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							



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LOG OF BORING 1D						SHEET 1 OF 1	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION <div style="text-align: center; font-size: 1.2em;">35.0'</div>		DATE OF BORING STARTED 8-22-72 COMPLETED 8-22-72	
TYPE & DESIGNATION OF DRILL 24" Bucket Auger		SAMPLES None		HAMMER None		DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.	
LOCATION: Refer to Plate No.							
1	SANDY CLAY: silty, fine sand, light to dark brown (CL)						-dry to moist
2	OIL-SATURATED CLAY: silty, fine sand, heavy oil saturation, odorous, brown to black (OL)						
3							
4							
5							
6	SANDY CLAY: silty, fine sand, reddish brown (CL)						
TOTAL DEPTH 6.0'							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING 1E						SHEET 1 OF 1		
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION <div style="text-align: center;">35.2'</div>		DATE OF BORING		
TYPE & DESIGNATION OF DRILL 24" Bucket Auger		SAMPLES None		HAMMER None		DEPTH TO WATER None		
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	<div style="text-align: center;">MOISTURE CONTENT %</div> <div style="display: flex; justify-content: space-around; font-size: small;"> PLNAT.LL </div> <div style="display: flex; justify-content: space-around; font-size: x-small;"> 1.02.03.04.05.0 </div>			DRY UNIT WEIGHT-PCF.
LOCATION: Refer to Plate No.								
1	SANDY CLAY: silty, fine sand, light to dark brown (CL)				-moist			
2								
3								
4								
5								
6								
7	SANDY CLAY: silty, fine sand, reddish brown (CL)				-moist			
8		TOTAL DEPTH 7.0'						
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

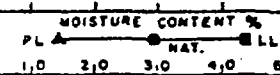
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LOG OF BORING 1F						SHEET 1 OF 1	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION <div style="text-align: center;">35.5'</div>		DATE OF BORING STARTED 8-22-72 COMPLETED 8-22-72	
TYPE & DESIGNATION OF DRILL 24" Bucket Auger		SAMPLES None		HAMMER None		DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.	
LOCATION: Refer to Plate No.							
1	SANDY/SILTY CLAY: (CL-ML) OIL-SATURATED CLAY: silty, odorous, brown to black (OL)						-dry
2							-moist
3							-moist
4							
5	SILTY SAND: clayey, fine sand, greenish brown (SM)						-moist
6							
7	TOTAL DEPTH 6.0'						
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

KEN O'BRIEN & ASSOCIATES CONSULTING ENGINEERS

LOG OF BORING 1G						SHEET 1 OF 1	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 35.8'		DATE OF BORING	
						STARTED	8-22-72
						COMPLETED	8-22-72
TYPE & DESIGNATION OF DRILL 24" Bucket Auger		SAMPLES None		HAMMER None		DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE			DRY UNIT W. GHT - PCF.
LOCATION: Refer to Plate No.							
1	SANDY CLAY: silty, fine sand, light to dark brown (CL)						-moist
2							
3							
4							
5							
6	OIL-SATURATED CLAY: silty, fine sand, extreme oil saturation, odorous, black (OL)						-wet
7							
8							
9	SANDY CLAY: silty, fine sand, reddish brown (CL) TOTAL DEPTH 8.0'						-moist
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING 1H						SHEET 1 OF 1	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 36.2'		DATE OF BORING	
TYPE & DESIGNATION OF DRILL 24" Bucket Auger				SAMPLES None		HAMMER None	
						DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE			DRY UNIT WEIGHT - PCF.
LOCATION: Refer to Plate No.							
1	SANDY CLAY: silty, fine sand, light to dark brown (CL)						-moist to wet
2	OIL-SATURATED CLAY: silty, fine sand, heavily oil saturated, extremely odorous, dark brown to black (OL)						
3							
4							
5	SANDY CLAY: silty, fine sand, reddish brown (CL)						-moist
6							
7							
8	TOTAL DEPTH 7.0'						
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

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LOG OF BORING 11

SHEET
1 OF 1

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION 36.3'	DATE OF BORING STARTED 8-22-72 COMPLETED 8-22-72	
TYPE & DESIGNATION OF DRILL 24" Bucket Auger	SAMPLES None	HAMMER None	DEPTH TO WATER None	

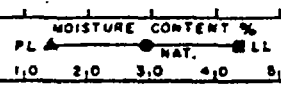
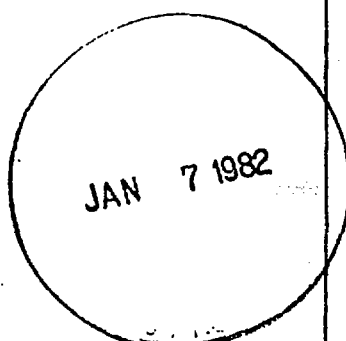
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %	DRY UNIT WEIGHT - PCF.

LOCATION: Refer to Plate No.


1	SANDY CLAY: silty, fine sand, light to dark brown (CL)						
2							
3	OIL-SATURATED CLAY: silty, fine sand, extreme heavy oil saturation, black (OL)						
4							
5							
6							
7	SILTY SAND: slight clay content, fine sand, slight odor, greenish brown (SM)						
8							
9	TOTAL DEPTH 8.0'						
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							



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CONSULTING ENGINEERS

LOG OF BORING 2A						SHEET <u>1</u> OF <u>1</u>			
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION <div style="text-align: center;">37.9'</div>		DATE OF BORING STARTED 8-22-72 COMPLETED 8-22-72			
TYPE & DESIGNATION OF DRILL 24" Bucket Auger		SAMPLES None		HAMMER None		DEPTH TO WATER None			
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	<div style="display: flex; align-items: center; justify-content: center;">  </div>			DRY UNIT WEIGHT - PCF.	
LOCATION: Refer to Plate No.									
1	<p>SANDY CLAY: dark brown (CL)</p> <p>OIL-SATURATED CLAY: extremely odorous, oil-saturated clay, silty, very little fine sand, black, viscous tar & oil (OL)</p> <div style="text-align: center; margin: 20px 0;">  </div> <p>(hole collapsed due to soft tar & oil)</p>							<div style="display: flex; justify-content: space-between;"> -dry -moist </div> <div style="text-align: center; margin-top: 100px;">collapsed</div>	
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13	TOTAL DEPTH 13.0'								
14									
15									
16									
17									
18									
19									
20									

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING 2B						SHEET 1 OF 1		
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 37.7'		DATE OF BORING STARTED 8-22-72 COMPLETED 8-22-72		
TYPE & DESIGNATION OF DRILL 24" Bucket Auger		SAMPLES None		HAMMER None		DEPTH TO WATER None		
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE				DRY UNIT WEIGHT-PCF.
LOCATION: Refer to Plate No.								
1	SANDY CLAY: fine sand, light to dark brown (CL)						-moist	
2								
3								
4								
5	OIL-SATURATED CLAY: silty, heavy oil/tar saturation, very odorous, dark brown to black (OL)							
6								
7								
8	TOTAL DEPTH 7.5'							
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING 2C

SHEET
1 OF 2

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION <div style="text-align: center;">37.8'</div>	DATE OF BORING <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">STARTED</td> <td style="width: 50%;">8-22-72</td> </tr> <tr> <td>COMPLETED</td> <td>8-22-72</td> </tr> </table>	STARTED	8-22-72	COMPLETED	8-22-72
STARTED	8-22-72						
COMPLETED	8-22-72						
TYPE & DESIGNATION OF DRILL <div style="text-align: center;">24" Bucket Auger</div>	SAMPLES <div style="text-align: center;">None</div>	HAMMER <div style="text-align: center;">None</div>	DEPTH TO WATER <div style="text-align: center;">None</div>				


DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.	
--------------------	--	--------	-----------------	------------------------	--	------------------------	--

LOCATION: Refer to Plate No.

1	SANDY CLAY: silty, fine sand, scattered pebbles to cobbles, dark brown (CL-OL)						-moist
2							
3							
4							
5							
6							
7							
8							
9	OIL-SATURATED CLAY: mixed oil & tar, organics, odorous, soft, black (OL)						-moist to wet
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

PROJECT 7298		LOG OF BORING 2C				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT %		DRY UNIT WEIGHT - PCF.
					PL	NAT. LL	
20							
21	OIL-TAR SATURATED: (continued) (OL)						-soft
22							
23	hole collapsed @ 23.0' TOTAL DEPTH 23.0'						
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING 2D						SHEET 1 OF 2	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 37.6'		DATE OF BORING STARTED 8-22-72 COMPLETED 8-22-72	
TYPE & DESIGNATION OF DRILL 24" Bucket Auger		SAMPLES None		HAMMER None		DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE			DRY UNIT WEIGHT - PCF.
LOCATION: Refer to Plate No.							
1	SANDY CLAY: silty, fine sand, few pebbles, dark brown (CL-OL)				-moist		
2							
3	OIL-SATURATED CLAY: silty, fine sand, scattered pebbles & cobbles to 3",						
4	odorous, heavy oil saturation, dark brown to						
5	black (OL)						
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

PROJECT 7298		LOG OF BORING 2D				SHEET 2 OF 2	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	<div style="text-align: center; margin-bottom: 5px;">MOISTURE CONTENT %</div> <div style="display: flex; justify-content: space-between; font-size: 0.8em;"> PL ▲ ● NAT. ■ LL </div> <div style="display: flex; justify-content: space-between; font-size: 0.7em;"> 1.0 2.0 3.0 4.0 5.0 </div>		DRY UNIT WEIGHT - PCF.
20							
21	OIL-SATURATED CLAY:					moist	
22	(continued)						
23	SANDY CLAY: silty, fine						
24	sand, pebbles to 3/8",						
25	light brown (CL)						
26							
27							
28							
29							
30							
31	TOTAL DEPTH 30.0'						
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

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LOG OF BORING 2E						SHEET 1 OF 1	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION 39.3'		DATE OF BORING	
TYPE & DESIGNATION OF DRILL 24" Bucket Auger				SAMPLES None		HAMMER None	
						DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.	
LOCATION: Refer to Plate No.							
1	SANDY CLAY: silty, fine sand, angular pebbles & gravel to 1", light to dark brown (CL)						-moist
2							
3							
4							
5	SANDY CLAY: silty, fine sand, color change to brown (CL)						-moist
6							
7							
8							
9	SILTY SAND: clayey, fine to medium sand, scattered hard clay inclusions, greenish brown (SM)						-moist
10							
11							
12							
13	TOTAL DEPTH 10.0'						
14							
15							
16							
17							
18							
19							
20							



KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BORING 2F

SHEET
1 OF 1

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION <div style="text-align: center;">39.7'</div>		DATE OF BORING <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">STARTED</td> <td style="padding: 2px;">8-22-72</td> </tr> <tr> <td style="padding: 2px;">COMPLETED</td> <td style="padding: 2px;">8-22-72</td> </tr> </table>		STARTED	8-22-72	COMPLETED	8-22-72
STARTED	8-22-72										
COMPLETED	8-22-72										
TYPE & DESIGNATION OF DRILL 24" Bucket Auger		SAMPLES None		HAMMER None		DEPTH TO WATER None					
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE			DRY UNIT WEIGHT - PCF.				
LOCATION: Refer to Plate No.											
1	SANDY CLAY: silty, fine to medium sand, scattered gravel to 1-1/2", reddish brown (CL)						-dry to moist -moist				
2											
3											
4											
5											
6	SANDY CLAY: silty, fine to medium sand, dark brown (CL)										
7											
8											
9											
10											
11	color change to brown										
12											
13											
14											
15											
16	SILTY SAND: clayey, fine sand, micaceous, limonite stained, brown (SM)						-moist				
17											
18											
19											
20											
21	TOTAL DEPTH 10.0'										
22											
23											
24											
25											
26											
27											
28											
29											
30											

KEN O'BRIEN & ASSOCIATES CONSULTING ENGINEERS

LOG OF BACKHOE 2(Retest)						SHEET 1 OF 1	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION --		DATE OF BORING	
TYPE & DESIGNATION OF DRILL 24" Backhoe Bucket				SAMPLES None		DEPTH TO WATER None	
CLASSIFICATION OF MATERIALS (in feet)				SYMBOL SAMPLE INTERVAL PENETRATION RESISTANCE		MOISTURE CONTENT % PL 1.0 2.0 3.0 4.0 5.0 NAT. 3.0 LL 4.0	
LOCATION: Refer to Plate No.				DRY UNIT WEIGHT - PCF.			
1	CLAYEY SAND/SANDY CLAY: heavily oil-saturated, brown to black, very viscous, sticky, odorous (SC-CL-OL)				-moist <div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: fit-content; margin: 20px auto;">hole caved to 15'x15'</div>		
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16	TOTAL DEPTH 15.0'						
17							
18							
19							
20							

KEN O'BRIEN & ASSOCIATES CONSULTING ENGINEERS

LOG OF BACKHOE 23

SHEET
1 OF 1

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION --		DATE OF BORING STARTED 8-25-72 COMPLETED 8-25-72	
TYPE & DESIGNATION OF DRILL 24" Backhoe Bucket		SAMPLES None		HAMMER None		DEPTH TO WATER None	

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.
1	OIL-SATURATED CLAY: fine to medium sand, silty, heavy oil saturation, organic, extremely odorous, dark brown (OL)					
2						
3						
4						
5						
6	CHEMICALLY-SATURATED CLAYEY/SILTY SAND: fine to medium sand, odorous, light greenish brown (SC-SM-OL)					
7						
8						
9						
10	TOTAL DEPTH 10.0'					
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BACKHOE 24

SHEET
1 OF 1

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION --	DATE OF BORING STARTED 8-25-72 COMPLETED 8-25-72
TYPE & DESIGNATION OF DRILL 24" Backhoe Bucket	SAMPLES None	HAMMER None	DEPTH TO WATER None

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.
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LOCATION: Refer to Plate No.

1	SILTY SAND: fine to medium, tan (SM)					-moist
2	SANDY CLAY: slightly odorous, dark brown (CL-OL)					
3	SANDY CLAY: fine sand, brown (CL)					
4						
5						
6	CLAYEY/SILTY SAND: fine to medium, brown (SC-SM)					-moist
7						
8						
9	TOTAL DEPTH 8.0'					
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

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CONSULTING ENGINEERS

LOG OF BACKHOE 25						SHEET 1 OF 1	
PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION --		DATE OF BORING	
TYPE & DESIGNATION OF DRILL 24" Backhoe Bucket				SAMPLES None		HAMMER None	
						DEPTH TO WATER None	
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.	
LOCATION: Refer to Plate No.							
1	CLAYEY/SILTY SAND: slight chemical odor, light to dark brown (SC-SM)					-moist	
2							
3							
4							
5							
6							
7	TOTAL DEPTH 6.0'						
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

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LOG OF BACKHOE 26

SHEET
1 OF 1

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY		SURFACE ELEVATION --		DATE OF BORING STARTED 8-25-72 COMPLETED 8-25-72	
TYPE & DESIGNATION OF DRILL 24" Backhoe Bucket	SAMPLES None	HAMMER None	DEPTH TO WATER None		
DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE	MOISTURE CONTENT % PL 1.0 2.0 3.0 4.0 5.0 NAT. LL
	DRY UNIT WEIGHT - PCF.				
LOCATION: Refer to Plate No.					
1	ASPHALT CONCRETE: dense				-moist
2	SANDY CLAY: fine to medium sand, dark brown (CL)				
3	?				
4					
5					
6	SANDY CLAY: fine to medium sand, silty, color change to brown (CL)				-moist
7					
8					
9	TOTAL DEPTH 8.0'				
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

LOG OF BACKHOE 27

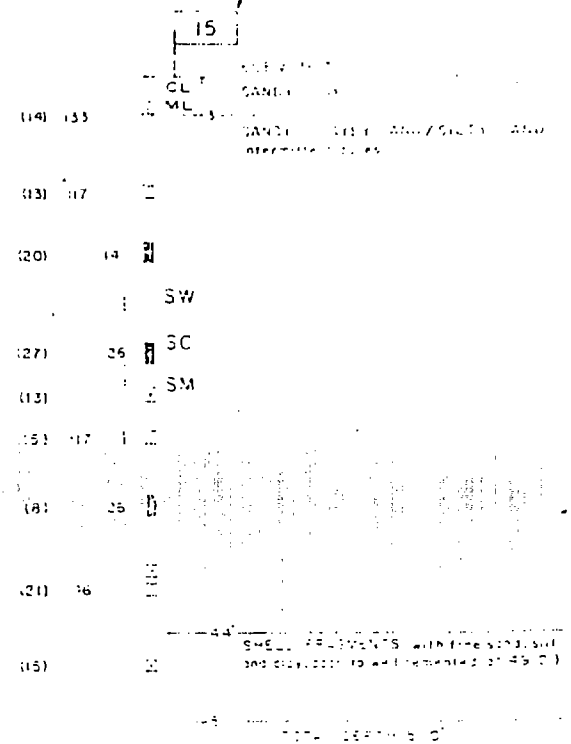
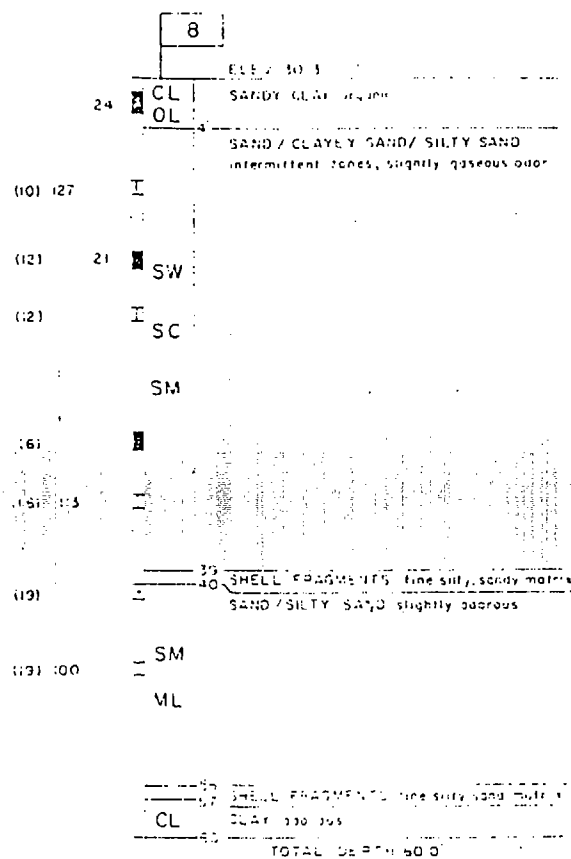
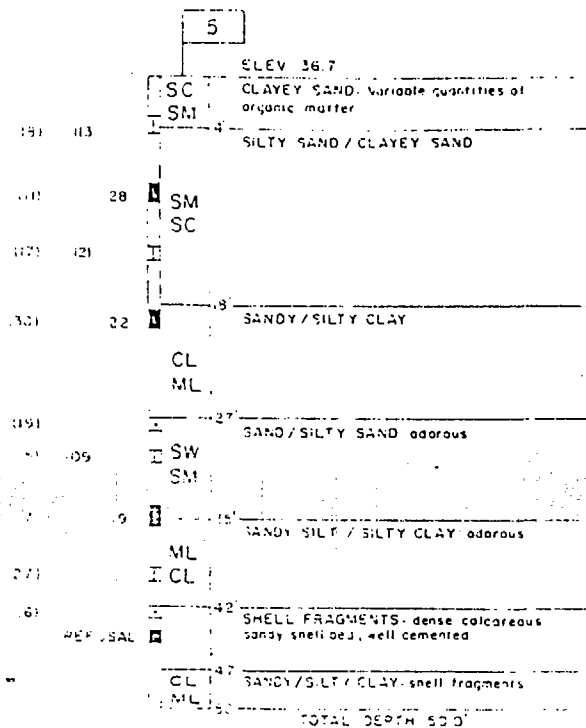
SHEET
1 OF 1

PROJECT CABOT, CABOT & FORBES C.C.&F. WESTERN DEVELOPMENT CO., INC. SHELL CHEMICAL PLANT PROPERTY				SURFACE ELEVATION --		DATE OF BORING STARTED 8-25-72 COMPLETED 8-25-72	
TYPE & DESIGNATION OF DRILL 24" Backhoe Bucket		SAMPLES None		HAMMER None		DEPTH TO WATER None	

DEPTH FROM SURFACE	CLASSIFICATION OF MATERIALS (in feet)	SYMBOL	SAMPLE INTERVAL	PENETRATION RESISTANCE		DRY UNIT WEIGHT - PCF.	
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LOCATION: Refer to Plate No.

1	SILTY SAND: fine to medium sand, tan (SM)						-moist
2	SANDY CLAY: fine to medium sand, slightly organic near upper contact, dark brown (CL)						
3							
4							
5							
6							
7	SANDY CLAY: fine to medium sand, color change to brown (CL)						-moist
8							
9	TOTAL DEPTH 8.0'						
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							



LEGEND

5 BORING NUMBER

- 2 SPT - STANDARD PENETRATION TEST. Standard Penetration Test is the number of blows required to drive a 60 inch I.D. Split Spoon Sampler that with a 140 pound hammer falling 30 inches.
- BAG SAMPLE - small disturbed sample for moisture and classification
- UNDISTURBED SPLIT SPOON SAMPLE - 2.43 inch I.D. with 1 inch rings and/or 5 or 6 inch sleeves, utilizing a 4,000 pound Kelly as a reaction
- UNIFIED SOIL CLASSIFICATION SYMBOL

MOISTURE CONTENT
% DRY WEIGHT

DRY DENSITY
LBS / CU FT

CABOT, CABOT & FORBES
C.C.B.F. WESTERN DEVELOPMENT CO., INC.
TYPICAL
SUBSURFACE SOIL CONDITIONS
SHELL CHEMICAL PLANT PROPERTY
Los Angeles, California

DATE BY: 10/1/72
DATE: 10/1/72
DRAWN BY: 10/1/72
DATE: 10/1/72

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS

CONTAMINATED
AREA NO. 3

SCALE 1"=100'

← E AVENUE B

DW&P TOWER

DW&P TOWER

DW&P RIGHT-OF-WAY

CONTAMINATED AREA NO. 2

CONTAMINATED AREA NO. 1

300' TO E. OF
VERMONT AVE

1010' TO E. OF VERMONT AVE.

EXISTING PROPERTY LINE

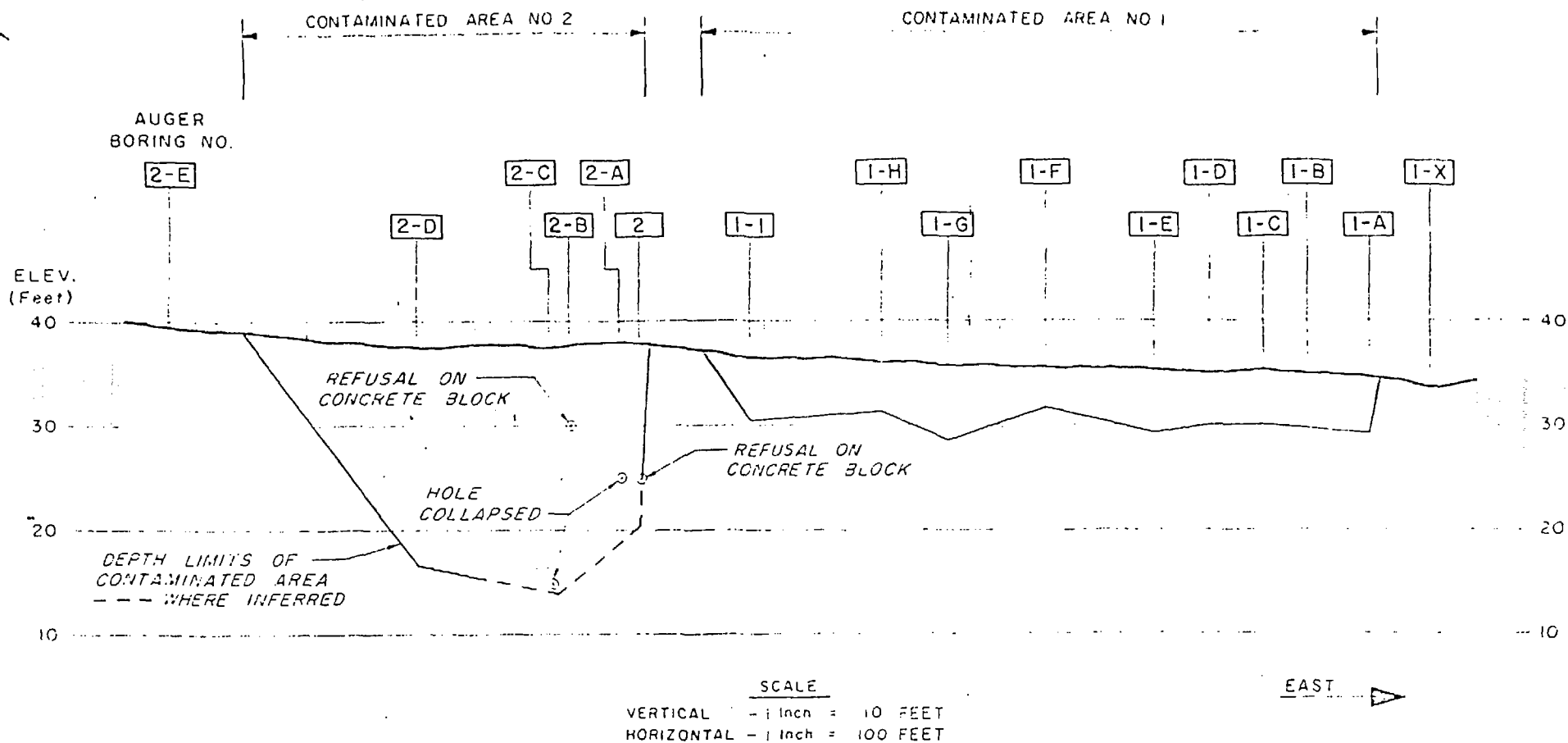
← DEL AMO BOULEVARD

CABOT, CABOT & FORBES
C.C.B.F. WESTERN DEVELOPMENT CO., INC.
PLAN VIEW

CONTAMINATED AREA NO'S. 1, 2 & 3
SHELL CHEMICAL PLANT PROPERTY
Los Angeles, California

DRAWN BY: B.J.S.	DATE: 5-2-72	JOB NO.	PLATE NO.
CHECKED BY: H.L.T.	DATE: 5-2-72	7229A	7

KEN O'BRIEN & ASSOCIATES
CONSULTING ENGINEERS



NOTE.
REFER TO PLATE NO. 7 FOR AREAL EXTENT

CABOT, CABOT & FORBES			
C.C. & F. WESTERN DEVELOPMENT CO., INC.			
PROFILE			
CONTAMINATED AREA NO'S. 1 & 2			
SHELL CHEMICAL PLANT PROPERTY			
Los Angeles, California			
CHG. BY: J.R.M.	DATE: 11-1-72	JOB NO.	PLATE NO.
CHG. BY: J.R.M.	DATE: 9-11-72	1258	1
KEN O'BRIEN & ASSOCIATES			
CONSULTING ENGINEERS			